Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records.

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TITLE: Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records.

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Key Words: Primary Care, Accident and Emergency Medicine, Audit, Organisation of Health Services

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ABSTRACT

Objectives: To assess the proportion of ED attendances that would be suitable for primary care and the inter-rater reliability of GP assessment of primary care suitability.

Design of Study: A random anonymised sample of all ED patients attending over a one month period.

Setting: Emergency Department of a UK Hospital serving a population of 600,000

Method: Four GPs independently used data extracted from clinical notes to rate appropriateness for treatment in primary care as well as need for investigations, specialist review or admission. Agreement was assessed using Cohen's Kappa

Results: Mean GP rating of appropriateness for primary care treatment was 43% (range 38% to 47%). Kappa for agreement was 0.54 (95% CI 0.44 to 0.64). In patients deemed not suitable for primary care, GPs were more likely to determine the need for specialist review (RR = 3.5, 95% CI 3.0 to 4.2, $p<0.001$) and admission (RR = 3.9, 95% CI 3.2 to 4.7, $p<0.001$). In patients assessed as suitable for primary care, GPs would initiate investigations in 51% of cases. Consensus over primary care appropriateness was higher for children than adult attenders.

Conclusion: A significant number of patients attending ED could be managed by GPs, including those requiring investigations at triage. Stronger agreement among GPs over place of care may be seen for paediatric than for adult attenders. There is now urgent need to implement more effective signposting of patients presenting with acute or urgent problems, and supporting a greater role for primary care in relieving the severe workflow pressures in ED in the UK.

ARTICLE SUMMARY

ARTICLE FOCUS

- Emergency departments are under increasing pressure from large numbers of attenders
- A proportion of patients attending emergency departments could be assessed in primary care but there are no standard tools to appropriately select such patients
- We set out to establish the level of agreement among general practitioners over which patients attending emergency departments can be seen in primary care

KEY MESSAGES

- On average, 40% of emergency department attenders could be seen in primary care
- There was greater consensus among the general practitioners for initial location of urgent care for paediatric patients compared with adult patients
- The need for investigations did not deter general practitioners from assessing that patients could initially be seen in primary care

STRENGTHS AND LIMITATIONS

- The sample of records was randomly generated and the general practitioners did not know the outcome of the patient attendance
- The number of general practitioners was small and the audit was carried out in one healthcare setting, which limits generalizability of our results
- The definition of acceptability for primary care was made subjectively by the general practitioners

INTRODUCTION

The last decade has seen a substantial increase in the number of patients attending hospital emergency departments (EDs)[1] and consequently the delivery of emergency healthcare in England is under significant threat currently and a major NHS priority.[2] Overcrowding in EDs is associated with delays in initiating treatment,[3] deficiencies in the processes of care,[4] a poorer patient experience[5] and higher mortality in patients who are subsequently admitted.[6] The introduction of the four hour wait limit for patients in EDs in England reduced the average waiting time for treatment and discharge,[7] which in itself reduces the risk of harm experienced by patients who leave without being seen due to long waits[8], but there are substantial pressures on the capacity of ED staff to continue to deliver this standard of care.[2]

The association between reduced access to primary care and increases in ED attendance in cross-sectional data[1] implies that a proportion of those attending can be managed in primary care. Although a review of causes of overcrowding in EDs suggest that delay in transfer of admitted patients to a hospital ward is important,[9] there is evidence that demand can be reduced by increasing access to primary care outside normal office hours.[10] However, given the multiple reasons for attendance at an ED with non-urgent problems[11-13] there is no clear intervention that can be implemented prior to attendance. Therefore a number of initiatives have been trialled within EDs once patients with non-urgent presentations attend, such as signposting to primary care[14] or employing GPs.[15, 16]

Accurate identification of non-urgent cases in the ED for either re-direction to primary care or to be seen within the ED by a GP could improve cost effectiveness of emergency care,[17] particularly as non-urgent presentations receive less investigations and follow up if managed by a GP.[18] However, there is no consensus over how best to screen for non-urgent presentations at triage[19]. Nevertheless, estimates of the proportion of patients who attend EDs who could be safely and appropriately managed in primary care are around 30% for both adults[20] and children.[21] Furthermore, in settings where EDs offer direct access to a GP, audits suggest that between 10% and 30% of overall attendances can be managed by a GP.[22]

Although incorporating primary care services within ED offers the potential for improved patient flow and reduced costs, a Cochrane review of primary care services in EDs concluded the evidence base is currently too weak to make recommendations as only three non-randomised studies were included.[23] Our aim in this study was to measure the level of agreement among primary care physicians about which types of patients who attend ED could be appropriately managed in primary care, and to assess which patient characteristics influence agreement.

METHODS

We developed a pilot data extraction tool that used information from the initial ED presentation of adult and child patients, namely demographics, reason for presentation, triage nurse assessment on an initial 20 cases. Two primary care physicians demonstrated that this information was sufficient to reach decisions about whether the patient appeared to be suitable for management in a primary care setting, and if not whether they would be likely to need further investigations, referral or hospital care.

A random sample generator was used to select cases from ED attenders to the John Radcliffe Hospital in Oxford, UK, each day for a one month period, November 2008. This ED has an annual attendance of 120,000 and is the only ED for the city of Oxford and referral centre for surrounding population of 600,000. All attendances were used as a sampling frame, covering all ages and the 24 hour opening of the department. We extracted clinical data from the record documented by a triage nurse and transferred this to an electronic questionnaire. We identified four primary care physicians, who had been fully accredited for more than 2 years and spend at least 50% of their professional time in routine general practice, to assess the cases. Two physician pairs each assessed half the sample. Each case was assessed independently by each physician for 1) appropriateness for primary care management; 2) need for investigations; 3) need for specialist review (without admission) and 4) need for hospital admission. Responses were limited to ‘yes’, ‘no’ and ‘unsure’.

We powered the study to test the hypothesis that the level of agreement between a physician pair was substantial (kappa 0.8) compared to moderate (Kappa 0.6) based on a probability of 50% of cases determined appropriate for primary care

management. For an alpha of 0.05, with 80% power we required a sample which equalled 765 in total.

Agreement results are presented as proportions and ranges. Responses were dichotomised to 'yes' versus 'no' and 'unsure'. Agreement was assessed using Cohen's Kappa using SPSS (version 17.0) for the overall sample and in clinical sub groups of age (adult versus paediatric), and broad categories of specialties (trauma, medical, surgical). Differences between proportions of primary and non-primary care cases requiring investigations, review or admission were summarised with relative risks (RR) and z tests used to assess significance of difference.

RESULTS

Of the 765 case notes retrieved, 629 (82%) contained sufficient information to include in the sample questionnaire (figure 1). Of the total, 25% were children (<16 years old) and 57% were triaged to the 'Minors' area of the ED on initial presentation. From the clinical information presented, the GPs were able to make a decision on suitable location of treatment in 88% of cases (n=1291 responses).

Overall, the GPs assessed that 43% (range 38% to 47%) of ED attendances were suitable for primary care management. Table 1 shows that agreement for this initial question for pair 1 gave a kappa of 0.54 (95% CI 0.44 to 0.64) and for pair 2, 0.47 (0.38 to 0.59).

Kappa (95% CI)	Suitable for primary care.	Further investigations required.	Hospital review required.	Hospital admission required.
GP Pair 1	0.54 (0.44 – 0.64)	0.41 (0.31 – 0.51)	0.35 (0.2 – 0.51)	0.22 (0.002 – 0.445)
GP Pair 2	0.47 (0.38 – 0.59)	0.49 (0.39 – 0.59)	0.31 (0.19 – 0.43)	0.48 (0.32 – 0.64)

Table 1. Levels of agreement between primary care physician pairs, Kappa (95%CI).

Figure 2 shows that in cases deemed suitable for primary care significantly fewer patients required investigations, specialist review or admission compared to ED cases or where physicians were unsure of the appropriate setting (figure 2). Among patients considered unsuitable for primary care, GPs were almost four times as likely to determine the need for specialist review (80% versus 23%, RR = 3.5, 95% CI 3.0 to 4.2, p<0.001) and for admission (66% vs. 17% RR = 3.9, 95% CI 3.2 to 4.7, p<0.001) when compared with patients considered suitable for primary care. Patients considered unsuitable for management in primary care were also more likely to need investigations compared with primary care cases (86%, versus 51% RR = 1.7 95% CI 1.5 to 1.8, p<0.001).

GPs assessed that 42% of adults (range 36% to 49%) and 48% of children (range 40% to 57%) could be seen in primary care. Table 2 shows that the strength of agreement was consistently higher for children across the clinical categories of trauma (kappa 0.62 to 0.64) and medical and surgical presentations (kappa 0.63 to 0.65)

	All adults	Adult trauma	Adult medicine/ surgery	All paediatrics	Paediatric trauma	Paediatric medicine/ surgery
Pair 1	0.50 (0.39-0.61)	0.52 (0.38-0.66)	0.49 (0.33-0.65)	0.65 (0.47-0.83)	0.64 (0.36-0.92	0.65 (0.42-0.88)
Pair 2	0.42 (0.31-0.53)	0.45 (0.29-0.61)	0.40 (0.24-0.56)	0.63 (0.45-0.81)	0.62 (0.37-0.87)	0.63 (0.38-0.88)

Table 2. Agreement on suitability for primary care, Kappa (95%CI)

DISCUSSION

Main findings

Our results suggest that on average four out of ten adults and children attending the ED could potentially be managed in primary care settings. While our study examined potential or likely management rather than actual management, it confirms the need to urgently review the current way of managing acutely unwell adults and children in the NHS.[2] Differences between primary care and non-primary care cases were most pronounced over the need for specialist review or admission, rather than need for

investigations. Agreement between GPs over which ED attenders could be seen in primary care is modest, but was higher for children than for adult patients. This superior agreement is preserved across broad categories of clinical presentations as described in presenting triage complaints and clinical data extracted from the triage histories. In general similar proportions of adult and paediatric attenders could be seen in primary care but there appears to be a stronger consensus over the paediatric cases.

Comparison with literature

Our results are similar to a New Zealand study which found equivalent level of agreement among clinicians about which patients could be managed in primary care with a retrospective case notes audit.[19] They found higher agreement among GPs than ED specialists over which patients would be appropriate for primary care, but did not explore patient factors that may influence levels of agreement. Although tools exist to help decide appropriateness for ED care from clinical records,[24] they have found similar proportions of cases deemed suitable for primary care as those found in our study relying on subjective judgement.[24] One older study using primary care physicians to rate case notes for primary care appropriateness did not explore the role of patient factors and reported lower levels of agreement (kappa = 0.34) even though raters had access to results of investigations and outcome of ED attendance.[25]

The weak evidence base to inform urgent care service redesign has previously been highlighted in the Primary Care Foundation's report[22] and is confirmed in a more recent Cochrane review.[23] The triage model employed to appropriately select primary care patients amongst the incoming ED workstream is likely to be a critical factor in the success of introducing primary care services for patients who have already presented to an ED. However there is evidence that, in general, triage of ED patients varies depending on the individual assessing patients, even if formal triage systems are used.[26, 27] One alternative to selecting patients after ED attendance via triage is to co-locate primary care services near EDs which enables patients to self-select for urgent primary care rather than attending the ED as it becomes easier to choose which service they feel is most appropriate given that they have made the decision to seek healthcare urgently. In an uncontrolled comparison, providing an out of hours primary care service near the ED in Maastricht resulted in 35% fewer ED attenders compared to another ED without similar primary care provision.[28]

Strengths and Limitations

The strengths of this study are that information on investigations undertaken and clinical outcomes were not provided, which reduces bias in the assessment of primary care appropriateness. Our findings therefore reflect the more realistic situation of a patient attending ED where this information is obviously not yet known. Our sample was random and included all ages, clinical presentations and severity of illness implying that our results are generalisable to the overall ED workstream. Nevertheless our study has some limitations. First, we do not have follow up data to determine the true level of agreement between GP assessment and subsequent clinical care, including for example the proportion of those considered appropriate for primary care who were sent home from ED or the proportion of those considered as needing admission who were admitted. Second, the sample of GPs was small and their individual clinical areas of expertise and comfort with different clinical presentations may not be representative of all primary care physicians and the definition of acceptability for primary care was left to individual judgement. This may be reflected in the modest levels of agreement that we found. Finally clinical data extracted from triage histories was incomplete in some cases which may have contributed to further variation in responses. In addition, this study was done in one university hospital which may not generalise to other settings. Given the importance of these results we suggest that they are replicated in other settings to test generalizability.

Clinical and policy implications

Our results add to growing concerns that increasing numbers of patients attending ED services in the UK threaten not only patient care but also efforts to contain health care spending. Even if the true proportion of adults and children currently seen in in ED who could be seen in primary care is less then the 40% that our study estimated, it implies that a major restructuring of how urgent or emergency care is provided is urgently needed. This needs to include ways to potentially signpost patients more effectively, while simultaneously providing support for providing urgent primary care service (when daytime primary care is already under severe pressure), Importantly the need for investigations was not seen to be a barrier to primary care assessment. Generating consensus criteria to identify patients who can be managed in primary care, implementing these criteria, and measuring the effects on patient flow, health

care costs, and patient satisfaction is a major priority.

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Conflicts of interest: none declared

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Ethical approval: none required

Contribution: MIWT, LMcC, EL conceived the study. CH, MT designed the study. MIWT, LMcC, EL collected the data. DSL contributed data, analysed the data and drafted the manuscript. All authors contributed to data interpretation, manuscript revisions and agreed the final manuscript.

References

1. Cowling TE, Cecil EV, Soljak MA, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. *PLoS One* 2013; **8**(6): e66699.

2. England N. Urgent and Emergency Care Review - Evidence Base Engagement Document. London: Department of Health; 2013.

3. Mills AM, Shofer FS, Chen EH, Hollander JE, Pines JM. The association between emergency department crowding and analgesia administration in acute abdominal pain patients. *Acad Emerg Med* 2009; **16**(7): 603-8.

4. Lee CC, Lee NY, Chuang MC, Chen PL, Chang CM, Ko WC. The impact of overcrowding on the bacterial contamination of blood cultures in the ED. *Am J Emerg Med* 2012; **30**(6): 839-45.

5. Collis J. Adverse effects of overcrowding on patient experience and care. *Emerg Nurse* 2010; **18**(8): 34-9.

6. Sun BC, Hsia RY, Weiss RE, et al. Effect of emergency department crowding on outcomes of admitted patients. *Ann Emerg Med* 2013; **61**(6): 605-11 e6.

7. Mason S, Weber EJ, Coster J, Freeman J, Locker T. Time patients spend in the emergency department: England's 4-hour rule-a case of hitting the target but missing the point? *Ann Emerg Med* 2012; **59**(5): 341-9.

8. Ng Y, Lewena S. Leaving the paediatric emergency department without being seen: understanding the patient and the risks. *J Paediatr Child Health* 2012; **48**(1): 10-5.

9. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. *Ann Emerg Med* 2008; **52**(2): 126-36.

10. van Uden CJ, Crebolder HF. Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? *Emerg Med J* 2004; **21**(6): 722-3.

11. Benahmed N, Laokri S, Zhang WH, et al. Determinants of nonurgent use of the emergency department for pediatric patients in 12 hospitals in Belgium. *Eur J Pediatr* 2012; **171**(12): 1829-37.

12. Philips H, Remmen R, De Paepe P, Buylaert W, Van Royen P. Out of hours care: a profile analysis of patients attending the emergency department and the general practitioner on call. *BMC Fam Pract* 2010; **11**: 88.

13. Koziol-McLain J, Price DW, Weiss B, Quinn AA, Honigman B. Seeking care for nonurgent medical conditions in the emergency department: through the eyes of the patient. *J Emerg Nurs* 2000; **26**(6): 554-63.

14. Gentile S, Vignally P, Durand AC, Gainotti S, Sambuc R, Gerbeaux P. Nonurgent patients in the emergency department? A French formula to prevent misuse. *BMC Health Serv Res* 2010; **10**: 66.

15. Bury G, Hungerford P, Langton D, Plunkett P. A & E services in Ireland: the potential role of general practice in accident and emergency services. *Ir J Med Sci* 2000; **169**(4): 245-7.

16. Kool RB, Homberg DJ, Kamphuis HC. Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands. *BMC Health Serv Res* 2008; **8**: 225.

17. Lee A, Hazlett CB, Chow S, et al. How to minimize inappropriate utilization of Accident and Emergency Departments: improve the validity of classifying the general practice cases amongst the A&E attendees. *Health Policy* 2003; **66**(2): 159-68.

18. Huibers L, Thijssen W, Koetsenruijter J, Giesen P, Grol R, Wensing M. GP cooperative and emergency department: an exploration of patient flows. *J Eval Clin Pract* 2013; **19**(2): 243-9.

19. Elley CR, Randall PJ, Bratt D, Freeman P. Can primary care patients be identified within an emergency department workload? *N Z Med J* 2007; **120**(1256): U2583.

20. Dale J, Green J, Reid F, Glucksman E. Primary care in the accident and emergency department: I. Prospective identification of patients. *BMJ* 1995; **311**(7002): 423-6.

21. Pileggi C, Raffaele G, Angelillo IF. Paediatric utilization of an emergency department in Italy. *Eur J Public Health* 2006; **16**(5): 565-9.

22. Carson D, Stern R, Clay H. Urgent Care. A practical guide to transforming same-day care in general practiceMay 2009, 2009. http://www.primarycarefoundation.co.uk/images/PrimaryCareFoundation/Downloading_Reports/Reports_and_Articles/Urgent_Care_Centres/Urgent_Care_May_09.pdf (accessed 28.6.2013).

23. Khangura JK, Flodgren G, Perera R, Rowe BH, Shepperd S. Primary care professionals providing non-urgent care in hospital emergency departments. *Cochrane Database Syst Rev* 2012; **11**: CD002097.

24. Sempere-Selva T, Peiro S, Sendra-Pina P, Martinez-Espin C, Lopez-Aguilera I. Inappropriate use of an accident and emergency department: magnitude, associated factors, and reasons--an approach with explicit criteria. *Ann Emerg Med* 2001; **37**(6): 568-79.

25. Gribben B. General practitioners' assessments of the primary care caseload in Middlemore Hospital Emergency Department. *N Z Med J* 2003; **116**(1169): U329.

26. Dallaire C, Poitras J, Aubin K, Lavoie A, Moore L. Emergency department triage: do experienced nurses agree on triage scores? *J Emerg Med* 2012; **42**(6): 736-40.

27. Nakagawa J, Ouk S, Schwartz B, Schriger DL. Interobserver agreement in emergency department triage. *Ann Emerg Med* 2003; **41**(2): 191-5.

28. van Uden CJ, Winkens RA, Wesseling G, Fiolet HF, van Schayck OC, Crebolder HF. The impact of a primary care physician cooperative on the caseload of an emergency department: the Maastricht integrated out-of-hours service. *J Gen Intern Med* 2005; **20**(7): 612-7.

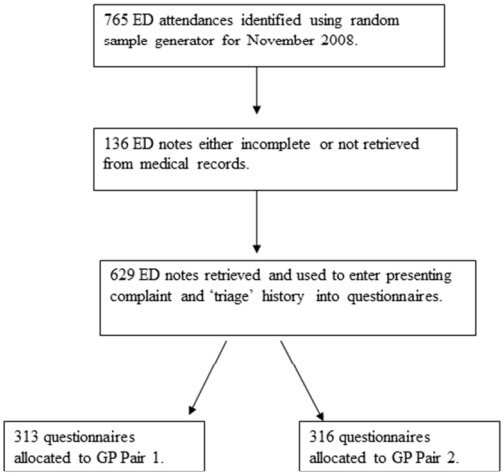

Figure 1. Selection of ED case notes reviewed by general practitioners

Selection of ED case notes reviewed by general practitioners
254x190mm (96 x 96 DPI)

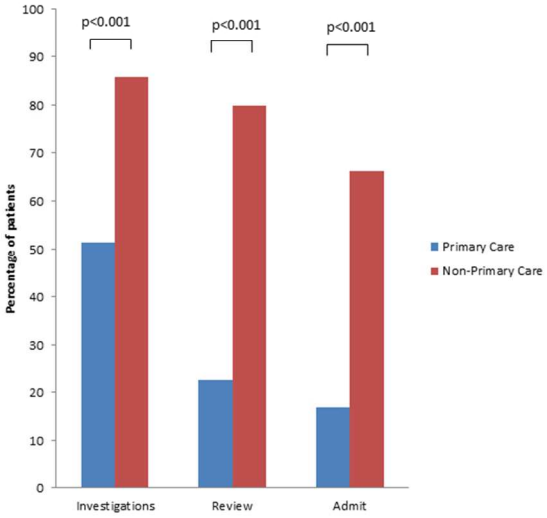

Figure 2. Percentage of patients considered suitable for primary care vs not suitable for primary care requiring investigations, specialist review or hospital admission

Percentage of patients considered suitable for primary care vs not suitable for primary care requiring investigations, specialist review or hospital admission
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BMJ open

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Key Words: Primary Care, Accident and Emergency Medicine, Audit, Organisation of Health Services

Word Count: 2566

ABSTRACT

Objectives: To assess the proportion of ED attendances that would be suitable for primary care and the inter-rater reliability of GP assessment of primary care suitability.

Design of Study: Survey of general practitioners' agreement of suitability for primary care on a random anonymised sample of all ED patients attending over a one month period.

Setting: Emergency Department of a UK Hospital serving a population of 600,000

Method: Four GPs independently used data extracted from clinical notes to rate appropriateness for treatment in primary care as well as need for investigations, specialist review or admission. Agreement was assessed using Cohen's Kappa

Results: Mean GP rating of appropriateness for primary care treatment was 43% (range 38% to 47%). Kappa for agreement was 0.54 (95% CI 0.44 to 0.64). In patients deemed not suitable for primary care, GPs were more likely to determine the need for specialist review (RR = 3.5, 95% CI 3.0 to 4.2, $p<0.001$) and admission (RR = 3.9, 95% CI 3.2 to 4.7, $p<0.001$). In patients assessed as suitable for primary care, GPs would initiate investigations in 51% of cases. Consensus over primary care appropriateness was higher for children than adult attenders.

Conclusion: A significant number of patients attending ED could be managed by GPs, including those requiring investigations at triage. Stronger agreement among GPs over place of care may be seen for paediatric than for adult attenders. More effective signposting of patients presenting with acute or urgent problems, and supporting a greater role for primary care in relieving the severe workflow pressures in ED in the UK are potential solutions.

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KEY MESSAGES

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- The need for investigations did not deter general practitioners from assessing that patients could initially be seen in primary care

STRENGTHS AND LIMITATIONS

- The sample of records was randomly generated and the general practitioners did not know the outcome of the patient attendance
- The number of general practitioners was small and the audit was carried out in one healthcare setting, which limits generalizability of our results
- The definition of acceptability for primary care was made subjectively by the general practitioners

INTRODUCTION

There has been a substantial increase in the number of patients attending hospital emergency departments (EDs) over the last six years in England.[1] The delivery of emergency healthcare in England is under significant threat currently, partly due to rising demand, and improvements to emergency care provision is now a major NHS priority.[2] Overcrowding in EDs is associated with delays in initiating treatment,[3] deficiencies in the processes of care,[4] a poorer patient experience[5] and higher mortality in patients who are subsequently admitted.[6] The introduction of the four hour wait limit for patients in EDs in England reduced the average waiting time for treatment and discharge,[7] which in itself reduces the risk of harm experienced by patients who leave without being seen due to long waits[8], but there are substantial pressures on the capacity of ED staff to continue to deliver this standard of care.[2]

The cross-sectional association between less timely access to primary care and greater rates of self-referred discharged ED attendances[1] implies that a proportion of those attending can be managed in primary care. Although a review of causes of overcrowding in EDs suggest that delay in transfer of admitted patients to a hospital ward is important,[9] there is evidence that demand can be reduced by increasing access to primary care outside normal office hours, from a study in the Netherlands in 2001/2002 using a before and after design.[10] However, given the multiple reasons for attendance at EDs with non-urgent problems[11-14] there is no clear intervention that can be implemented prior to attendance. Therefore a number of interventions designed for patients who present with non-urgent problems have been trialled within EDs, such as signposting to primary care[15] or employing primary care physicians (general practitioners; GPs).[16, 17]

Accurate identification of non-urgent cases in EDs for either re-direction to primary care or to be seen within EDs by a GP could improve cost effectiveness of emergency care,[18] particularly as some studies suggest that non-urgent presentations receive less investigations and follow up if managed by a GP.[19] However, there is no consensus over how best to screen for non-urgent presentations at triage[20]. Nevertheless, estimates of the proportion of patients who attend EDs who could be safely and appropriately managed in primary care are around 30% for both adults[21] and

children.[22] Furthermore, in settings where EDs offer direct access to a GP, audits suggest that between 10% and 30% of overall attendances can be managed by a GP.[23]

Although incorporating primary care services within EDs offers the potential for improved patient flow and reduced costs, a Cochrane review of primary care services in EDs concluded the evidence base is currently too weak to make recommendations as only three non-randomised studies were included.[24] Our aim in this study was to measure the level of agreement among primary care physicians about who could be appropriately managed in primary care, within different groups of patients (based on age range or clinical categories of trauma, medicine or surgery) and to assess whether agreement differed between these groups.

METHODS

The John Radcliffe Hospital emergency department is a consultant-led, 24 hour service with full resuscitation facilities without a co-located urgent care centre or nearby walk-in centre. We developed a pilot data extraction tool based on that used by Lowy et al[25] using information from the initial ED presentation of adult and child patients, including demographics, reason for presentation and triage nurse assessment on an initial 20 cases. Two GPs demonstrated that this information was sufficient to reach decisions about whether the patient appeared to be suitable for management in a primary care setting, and if not whether they would be likely to need further investigations, referral or hospital care.

A random sample generator was used to select cases from ED attenders to the John Radcliffe Hospital in Oxford, UK, each day for a one month period, November 2008. This ED has an annual attendance of 120,000 and is the only ED for the city of Oxford and referral centre for surrounding population of 600,000. All attendances were used as a sampling frame, covering all ages and the 24 hour opening of the department. We extracted data established as satisfactory in the pilot for GP decision making from the record documented by a triage nurse and transferred this to an electronic questionnaire. We identified four primary care physicians, who had been fully accredited for more than 2 years and spend at least 50% of their professional time in routine general practice, to assess the cases. Two physician pairs each assessed half the sample. Each case was assessed independently by each physician for

1) appropriateness for primary care management; 2) need for investigations; 3) need for specialist review (without admission) and 4) need for hospital admission. Responses were limited to 'yes', 'no' and 'unsure'.

We powered the study to test the hypothesis that the level of agreement between a physician pair was substantial (kappa 0.8) compared to moderate (Kappa 0.6) based on a probability of 50% of cases determined appropriate for primary care management. For an alpha of 0.05, with 80% power we required a sample which equalled 765 in total.

Raw agreement results are presented as proportions and ranges. Responses were dichotomised to 'yes' versus 'no' and 'unsure', to conservatively estimate those suitable for primary care management. Agreement was assessed using Cohen's Kappa using SPSS (version 17.0) for the overall sample and in clinical sub groups of age (adult versus paediatric), and broad categories of specialties (trauma, medical, surgical). Differences between proportions of primary and non-primary care cases requiring investigations, review or admission were summarised with relative risks (RR) and z tests used to assess significance of difference.

This study was conducted as a service evaluation and data were obtained primarily for audit purposes according to the guidance from the Oxford Radcliffe Hospital Trust audit policies. In accordance with the guidance for research in place at the time the study was conducted, research ethics approval was not required for service evaluations such as this study. All personnel involved in handling data were employees of the hospital trust or (then) primary care trust. Data were anonymised and treated according to the standard operating procedures for patient data in place at the Trust and the University of Oxford Department of Primary Care.

RESULTS

Of the 765 case notes retrieved, 629 (82%) contained sufficient information to include in the sample questionnaire (figure 1). Of the total, 25% were children (<16 years old) and 57% were triaged to the 'Minors' area of the ED on initial presentation. From the

clinical information presented, the GPs were able to make a decision on suitable location of management in 88% of cases (n=1258 responses).

The mean GP assessment of ED attendances suitable for primary care management was 43% (range 38% to 47%). Table 1 shows that agreement for this initial question for pair 1 gave a kappa of 0.54 (95% CI 0.44 to 0.64) and for pair 2, 0.47 (95% CI 0.38 to 0.59).

Kappa (95% CI)	Suitable for primary care.	Further investigations required.	Hospital review required.	Hospital admission required.
GP Pair 1	0.54 (0.44 – 0.64)	0.41 (0.31 – 0.51)	0.35 (0.2 – 0.51)	0.22 (0.002 – 0.445)
GP Pair 2	0.47 (0.38 – 0.59)	0.49 (0.39 – 0.59)	0.31 (0.19 – 0.43)	0.48 (0.32 – 0.64)

Table 1. Levels of agreement between primary care physician pairs, Kappa (95%CI).

Figure 2 shows that in cases deemed suitable for primary care management, significantly fewer patients were deemed to require investigations, specialist review or admission compared to ED cases or where physicians were unsure of the appropriate setting (figure 2). Among patients considered unsuitable for primary care management, GPs were almost four times as likely to determine the need for specialist review (80% vs. 23%, RR = 3.5, 95% CI 3.0 to 4.2, $p<0.001$) and for admission (66% vs. 17% RR = 3.9, 95% CI 3.2 to 4.7, $p<0.001$) when compared with patients considered suitable for primary care. Patients considered unsuitable for management in primary care were also more likely to need investigations compared with primary care cases (86% vs. 51%, RR = 1.7 95% CI 1.5 to 1.8, $p<0.001$).

The mean GP assessment on suitability for primary care management was 42% in adults (range 36% to 49%) and 48% in children (range 40% to 57%). Table 2 shows that the strength of agreement was consistently higher for children across the clinical

categories of trauma (kappa 0.62 to 0.64) and medical and surgical presentations (kappa 0.63 to 0.65)

Kappa (95% CI)	All adults	Adult trauma	Adult medicine/ surgery	All paediatrics	Paediatric trauma	Paediatric medicine/ surgery
GP Pair 1	0.50 (0.39-0.61)	0.52 (0.38-0.66)	0.49 (0.33-0.65)	0.65 (0.47-0.83)	0.64 (0.36-0.92	0.65 (0.42-0.88)
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Table 2. Agreement on suitability for primary care, Kappa (95%CI)

DISCUSSION

Main findings

Our results suggest that on average four out of ten adults and children attending the ED could potentially be managed in primary care settings. While our study examined potential or likely management rather than actual management, it confirms the need to urgently review the current way of managing acutely unwell adults and children in the NHS.[2] Differences between primary care and non-primary care cases were most pronounced over the need for specialist review or admission, rather than need for investigations. Agreement between GPs over which ED attenders could be seen in primary care is modest, but was higher for children than for adult patients. This superior agreement is preserved across broad categories of clinical presentations as described in presenting triage complaints and clinical data extracted from the triage histories. In general similar proportions of adult and paediatric attenders could be seen in primary care but there appears to be a stronger consensus over the paediatric cases.

Comparison with literature

Our results are similar to a New Zealand study which found equivalent level of agreement among clinicians about which patients could be managed in primary care with a retrospective case notes audit.[20] They found higher agreement among GPs than

ED specialists over which patients would be appropriate for primary care, but did not explore patient factors that may influence levels of agreement. Although tools exist to help decide appropriateness for ED care from clinical records,[26] they have found similar proportions of cases deemed suitable for primary care as those found in our study relying on subjective judgement.[26] One older study using primary care physicians to rate case notes for primary care appropriateness did not explore the role of patient factors and reported lower levels of agreement (kappa = 0.34) even though raters had access to results of investigations and outcome of ED attendance.[27] Low levels of agreement among different professionals about appropriateness of different services for patients attending EDs and walk-in-centres have also been reported, but may be explained by the fact that different professional groups were used to determine consensus.[28]

The weak evidence base to inform urgent care service redesign has previously been highlighted in the Primary Care Foundation's report[23] and is confirmed in a more recent Cochrane review.[24] The triage model employed to appropriately select primary care patients amongst the incoming ED workstream is likely to be a critical factor in the success of introducing primary care services for patients who have already presented to an ED. However there is evidence that, in general, triage of ED patients varies depending on the individual assessing patients, even if formal triage systems are used.[29, 30] One alternative to selecting patients after ED attendance via triage is to co-locate primary care services near EDs which enables patients to self-select for urgent primary care rather than attending the ED as it becomes easier to choose which service they feel is most appropriate given that they have made the decision to seek healthcare urgently. In an uncontrolled comparison, providing an out of hours primary care service near the ED in Maastricht resulted in 35% fewer ED attenders compared to another ED without similar primary care provision.[31]

Strengths and Limitations

The strengths of this study are that information on investigations undertaken and clinical outcomes were not provided, which reduces bias in the assessment of primary care appropriateness. Our findings therefore reflect the more realistic situation of a patient attending ED where this information is obviously not yet known. Our sample was random and included all ages, clinical presentations and severity of illness

implying that our results are generalisable to the overall ED workstream. Nevertheless our study has some limitations. First, we do not have follow up data to determine the true level of agreement between GP assessment and subsequent clinical care, including for example the proportion of those considered appropriate for primary care who were sent home from ED or the proportion of those considered as needing admission who were admitted. Second, the sample of GPs was small and their individual clinical areas of expertise and comfort with different clinical presentations may not be representative of all primary care physicians and the definition of acceptability for primary care was left to individual judgement. This may be reflected in the modest levels of agreement that we found. Thirdly clinical data extracted from triage histories was incomplete in some cases which may have contributed to further variation in responses. Finally we did not ask the GPs if they considered other community based health professionals e.g. pharmacists as an appropriate choice of healthcare access given the clinical presentations. In addition, this study was done in one university hospital during one month of the year which may not generalise to other settings. Given the importance of these results we suggest that they are replicated in other settings to test generalizability.

Clinical and policy implications

Our results add to growing concerns that increasing numbers of patients attending ED services in the UK threaten not only patient care but also efforts to contain health care spending. Even if the true proportion of adults and children currently seen in in ED who could be seen in primary care is less than the 43% that our study estimated, it implies that a major restructuring of how urgent or emergency care is provided is urgently needed. This needs to include ways to potentially signpost patients more effectively, while simultaneously providing support for providing urgent primary care service (when daytime primary care is already under severe pressure), Importantly the need for investigations was not seen to be a barrier to primary care assessment. Generating consensus criteria to identify patients who can be managed in primary care, implementing these criteria, and measuring the effects on patient flow, health care costs, and patient satisfaction is a major priority.

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Conflicts of interest: none declared

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Ethical approval: none required

Contribution: MIWT, LMcC, EL conceived the study. CH, MT designed the study. MIWT, LMcC, EL collected the data. DSL contributed data, analysed the data and drafted the manuscript. All authors contributed to data interpretation, manuscript revisions and agreed the final manuscript.

References

1. Cowling TE, Cecil EV, Soljak MA, Lee JT, Millett C, Majeed A, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. PLoS One. 2013; **8**(6): e66699.
2. NHS England. Urgent and Emergency Care Review - Evidence Base Engagement Document. London: Department of Health; 2013.
3. Mills AM, Shofer FS, Chen EH, Hollander JE, Pines JM. The association between emergency department crowding and analgesia administration in acute abdominal pain patients. Acad Emerg Med. 2009; **16**(7): 603-8.
4. Lee CC, Lee NY, Chuang MC, Chen PL, Chang CM, Ko WC. The impact of overcrowding on the bacterial contamination of blood cultures in the ED. Am J Emerg Med. 2012; **30**(6): 839-45.
5. Collis J. Adverse effects of overcrowding on patient experience and care. Emerg Nurse. 2010; **18**(8): 34-9.
6. Sun BC, Hsia RY, Weiss RE, Zingmond D, Liang LJ, Han W, et al. Effect of emergency department crowding on outcomes of admitted patients. Ann Emerg Med. 2013; **61**(6): 605-11 e6.
7. Mason S, Weber EJ, Coster J, Freeman J, Locker T. Time patients spend in the emergency department: England's 4-hour rule-a case of hitting the target but missing the point? Ann Emerg Med. 2012; **59**(5): 341-9.
8. Ng Y, Lewena S. Leaving the paediatric emergency department without being seen: understanding the patient and the risks. J Paediatr Child Health. 2012; **48**(1): 10-5.
9. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med. 2008; **52**(2): 126-36.

10. van Uden CJ, Crebolder HF. Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? Emerg Med J. 2004; **21**(6): 722-3.
11. Agarwal S, Banerjee J, Baker R, Conroy S, Hsu R, Rashid A, et al. Potentially avoidable emergency department attendance: interview study of patients' reasons for attendance. Emerg Med J. 2012; **29**(12): e3.
12. Benahmed N, Laokri S, Zhang WH, Verhaeghe N, Trybou J, Cohen L, et al. Determinants of nonurgent use of the emergency department for pediatric patients in 12 hospitals in Belgium. Eur J Pediatr. 2012; **171**(12): 1829-37.
13. Philips H, Remmen R, De Paepe P, Buylaert W, Van Royen P. Out of hours care: a profile analysis of patients attending the emergency department and the general practitioner on call. BMC Fam Pract. 2010; **11**: 88.
14. Koziol-McLain J, Price DW, Weiss B, Quinn AA, Honigman B. Seeking care for nonurgent medical conditions in the emergency department: through the eyes of the patient. J Emerg Nurs. 2000; **26**(6): 554-63.
15. Gentile S, Vignally P, Durand AC, Gainotti S, Sambuc R, Gerbeaux P. Nonurgent patients in the emergency department? A French formula to prevent misuse. BMC Health Serv Res. 2010; **10**: 66.
16. Bury G, Hungerford P, Langton D, Plunkett P. A & E services in Ireland: the potential role of general practice in accident and emergency services. Ir J Med Sci. 2000; **169**(4): 245-7.
17. Kool RB, Homberg DJ, Kamphuis HC. Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands. BMC Health Serv Res. 2008; **8**: 225.
18. Lee A, Hazlett CB, Chow S, Lau FL, Kam CW, Wong P, et al. How to minimize inappropriate utilization of Accident and Emergency Departments: improve the validity of classifying the general practice cases amongst the A&E attendees. Health Policy. 2003; **66**(2): 159-68.
19. Huibers L, Thijssen W, Koetsenruijter J, Giesen P, Grol R, Wensing M. GP cooperative and emergency department: an exploration of patient flows. J Eval Clin Pract. 2013; **19**(2): 243-9.
20. Elley CR, Randall PJ, Bratt D, Freeman P. Can primary care patients be identified within an emergency department workload? N Z Med J. 2007; **120**(1256): U2583.
21. Dale J, Green J, Reid F, Glucksman E. Primary care in the accident and emergency department: I. Prospective identification of patients. BMJ. 1995; **311**(7002): 423-6.
22. Pileggi C, Raffaele G, Angelillo IF. Paediatric utilization of an emergency department in Italy. Eur J Public Health. 2006; **16**(5): 565-9.
23. Carson D, Stern R, Clay H. Urgent Care. A practical guide to transforming same-day care in general practice. Lewes, East Sussex: Primary Care Foundation; 2009.
24. Khangura JK, Flodgren G, Perera R, Rowe BH, Shepperd S. Primary care professionals providing non-urgent care in hospital emergency departments. Cochrane Database Syst Rev. 2012; **11**: CD002097.
25. Lowy A, Kohler B, Nicholl J. Attendance at accident and emergency departments: unnecessary or inappropriate? Journal of public health medicine. 1994; **16**(2): 134-40.
26. Sempere-Selva T, Peiro S, Sendra-Pina P, Martinez-Espin C, Lopez-Aguilera I. Inappropriate use of an accident and emergency department: magnitude, associated factors, and reasons--an approach with explicit criteria. Ann Emerg Med. 2001; **37**(6): 568-79.
27. Gribben B. General practitioners' assessments of the primary care caseload in Middlemore Hospital Emergency Department. N Z Med J. 2003; **116**(1169): U329.
28. Bickerton J, Davies J, Davies H, Apau D, Procter S. Streaming primary urgent care: a prospective approach. Prim Health Care Res Dev. 2012; **13**(2): 142-52.
29. Dallaire C, Poitras J, Aubin K, Lavoie A, Moore L. Emergency department triage: do experienced nurses agree on triage scores? J Emerg Med. 2012; **42**(6): 736-40.
30. Nakagawa J, Ouk S, Schwartz B, Schriger DL. Interobserver agreement in emergency department triage. Ann Emerg Med. 2003; **41**(2): 191-5.
31. van Uden CJ, Winkens RA, Wesseling G, Fiolet HF, van Schayck OC, Crebolder HF. The impact of a primary care physician cooperative on the caseload of an emergency department: the Maastricht integrated out-of-hours service. J Gen Intern Med. 2005; **20**(7): 612-7.

TITLE: Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records analysed in a service evaluation project.

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Key Words: Primary Care, Accident and Emergency Medicine, Audit, Organisation of Health Services

Word Count: 2265

ABSTRACT

Objectives: To assess the proportion of ED attendances that would be suitable for primary care and the inter-rater reliability of GP assessment of primary care suitability.

Design of Study: Survey of general practitioners' agreement of suitability for primary care on a random anonymised sample of all ED patients attending over a one month period. ~~A random anonymised sample of all ED patients attending over a one month period.~~

Setting: Emergency Department of a UK Hospital serving a population of 600,000

Method: Four GPs independently used data extracted from clinical notes to rate appropriateness for treatment in primary care as well as need for investigations, specialist review or admission. Agreement was assessed using Cohen's Kappa

Results: Mean GP rating of appropriateness for primary care treatment was 43% (range 38% to 47%). Kappa for agreement was 0.54 (95% CI 0.44 to 0.64). In patients deemed not suitable for primary care, GPs were more likely to determine the need for specialist review (RR = 3.5, 95% CI 3.0 to 4.2, p<0.001) and admission (RR = 3.9, 95% CI 3.2 to 4.7, p<0.001). In patients assessed as suitable for primary care, GPs would initiate investigations in 51% of cases. Consensus over primary care appropriateness was higher for children than adult attenders.

Conclusion: A significant number of patients attending ED could be managed by GPs, including those requiring investigations at triage. Stronger agreement among GPs over place of care may be seen for paediatric than for adult attenders. More effective signposting of patients presenting with acute or urgent problems, and supporting a greater role for primary care in relieving the severe workflow pressures in ED in the UK are potential solutions. ~~There is now urgent need to implement more effective signposting of patients presenting with acute or urgent problems, and~~

~~supporting a greater role for primary care in relieving the severe workflow pressures in ED in the UK~~.

ARTICLE SUMMARY

ARTICLE FOCUS

- Emergency departments are under increasing pressure from large numbers of attenders
- A proportion of patients attending emergency departments could be assessed in primary care but there are no standard tools to appropriately select such patients
- We set out to establish the level of agreement among general practitioners over which patients attending emergency departments can be seen in primary care

KEY MESSAGES

- On average, 43~~0~~% of emergency department attenders could be seen in primary care
- There was greater consensus among the general practitioners for initial location of urgent care for paediatric patients compared with adult patients
- The need for investigations did not deter general practitioners from assessing that patients could initially be seen in primary care

STRENGTHS AND LIMITATIONS

- The sample of records was randomly generated and the general practitioners did not know the outcome of the patient attendance
- The number of general practitioners was small and the audit was carried out in one healthcare setting, which limits generalizability of our results
- The definition of acceptability for primary care was made subjectively by the general practitioners

INTRODUCTION

There has been a substantial increase in the number of patients attending hospital emergency departments (EDs) over the last six years in England.[1] The delivery of emergency healthcare in England is under significant threat currently, partly due to rising demand, and improvements to emergency care provision is now a major NHS priority.[2] ~~The last decade has seen a substantial increase in the number of patients attending hospital emergency departments (EDs)[1] and consequently the delivery of emergency healthcare in England is under significant threat currently and a major NHS priority.[2]~~ Overcrowding in EDs is associated with delays in initiating treatment,[3] deficiencies in the processes of care,[4] a poorer patient experience[5] and higher mortality in patients who are subsequently admitted.[6] The introduction of the four hour wait limit for patients in EDs in England reduced the average waiting time for treatment and discharge,[7] which in itself reduces the risk of harm experienced by patients who leave without being seen due to long waits[8], but there are substantial pressures on the capacity of ED staff to continue to deliver this standard of care.[2]

The cross-sectional association between less timely access to primary care and greater rates of self-referred discharged ED attendances~~The association between reduced access to primary care and increases in ED attendance in cross-sectional data~~[1] implies that a proportion of those attending can be managed in primary care. Although a review of causes of overcrowding in EDs suggest that delay in transfer of admitted patients to a hospital ward is important,[9] there is evidence that demand can be reduced by increasing access to primary care outside normal office hours, from a study in the Netherlands in 2001/2002 using a before and after design.[10] However, given the multiple reasons for attendance at ~~an~~ EDs with non-urgent problems[11-14] there is no clear intervention that can be implemented prior to attendance.

Therefore a number of interventions designed for patients who present with non-urgent problems have been trialled within EDs, such as signposting to primary care[15] or employing primary care physicians (general practitioners; GPs).[16, 17]

~~Therefore a number of initiatives have been trialled within EDs once patients with non-urgent presentations attend, such as signposting to primary care[15] or employing GPs.[16, 17]~~

Accurate identification of non-urgent cases in ~~the~~ EDs for either re-direction to primary care or to be seen within ~~the~~ EDs by a GP could improve cost effectiveness of emergency care,[18] particularly as as some studies suggest that non-urgent presentations receive less investigations and follow up if managed by a GP.[19] However, there is no consensus over how best to screen for non-urgent presentations at triage[20]. Nevertheless, estimates of the proportion of patients who attend EDs who could be safely and appropriately managed in primary care are around 30% for both adults[21] and children.[22] Furthermore, in settings where EDs offer direct access to a GP, audits suggest that between 10% and 30% of overall attendances can be managed by a GP.[23]

Although incorporating primary care services within EDs offers the potential for improved patient flow and reduced costs, a Cochrane review of primary care services in EDs concluded the evidence base is currently too weak to make recommendations as only three non-randomised studies were included.[24] Our aim in this study was to measure the level of agreement among primary care physicians about who could be appropriately managed in primary care, within different groups of patients (based on age range or clinical categories of trauma, medicine or surgery) and to assess whether agreement differed between these groups.

~~which types of patients who attend ED could be appropriately managed in primary care, and to assess which patient characteristics influence agreement.~~

METHODS

The John Radcliffe Hospital emergency department is a consultant-led, 24 hour service with full resuscitation facilities without a co-located urgent care centre or nearby walk-in centre. We developed a pilot data extraction tool based on that used by Lowy et al[25] ~~that~~ usinged information from the initial ED presentation of adult and child patients, namely demographics, reason for presentation, triage nurse assessment on an initial 20 cases. Two ~~primary care physicians~~GPs demonstrated that this

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This study was conducted as a service evaluation and data were obtained primarily for audit purposes according to the guidance from the Oxford Radcliffe Hospital Trust audit policies. In accordance with the guidance for research in place at the time the study was conducted, research ethics approval was not required for service evaluations such as this study. All personnel involved in handling data were employees of the hospital trust or (then) primary care trust. Data were anonymised and treated according to the standard operating procedures for patient data in place at the Trust and the University of Oxford Department of Primary Care.

RESULTS

Of the 765 case notes retrieved, 629 (82%) contained sufficient information to include in the sample questionnaire (figure 1). Of the total, 25% were children (<16 years old) and 57% were triaged to the 'Minors' area of the ED on initial presentation. From the clinical information presented, the GPs were able to make a decision on suitable location of treatment in 88% of cases (n=125891 responses).

The mean GP assessment of ED attendances suitable for primary care management was 43% (range 38% to 47%)~~Overall, the GPs assessed that 43% (range 38% to 47%) of ED attendances were suitable for primary care management~~. Table 1 shows that agreement for this initial question for pair 1 gave a kappa of 0.54 (95% CI 0.44 to 0.64) and for pair 2, 0.47 (95% CI 0.38 to 0.59).

Kappa (95% CI)	Suitable for primary care.	Further investigations required.	Hospital review required.	Hospital admission required.
GP Pair 1	0.54 (0.44 – 0.64)	0.41 (0.31 – 0.51)	0.35 (0.2 – 0.51)	0.22 (0.002 – 0.445)
GP Pair 2	0.47 (0.38 – 0.59)	0.49 (0.39 – 0.59)	0.31 (0.19 – 0.43)	0.48 (0.32 – 0.64)

Table 1. Levels of agreement between primary care physician pairs, Kappa (95%CI).

Figure 2 shows that in cases deemed suitable for primary care management, significantly fewer patients were deemed to required investigations, specialist review or admission compared to ED cases or where physicians were unsure of the appropriate setting (figure 2). Among patients considered unsuitable for primary care management, GPs were almost four times as likely to determine the need for specialist review (80% versus 23%, RR = 3.5, 95% CI 3.0 to 4.2, p<0.001) and for admission (66% vs. 17% RR = 3.9, 95% CI 3.2 to 4.7, p<0.001) when compared with patients considered suitable for primary care. Patients considered unsuitable for management in primary care were also more likely to need investigations compared with primary care cases (86%, versus 51% RR = 1.7 95% CI 1.5 to 1.8, p<0.001).

The mean GP assessment on suitability for primary care management was 42% in adults (range 36% to 49%) and 48% in children (range 40% to 57%). GPs assessed that 42% of adults (range 36% to 49%) and 48% of children (range 40% to 57%) could be seen in primary care. Table 2 shows that the strength of agreement was consistently higher for children across the clinical categories of trauma (kappa 0.62 to 0.64) and medical and surgical presentations (kappa 0.63 to 0.65)

Kappa (95% CI)	All adults	Adult trauma	Adult medicine/ surgery	All paediatrics	Paediatric trauma	Paediatric medicine/ surgery
GP Pair 1	0.50 (0.39-0.61)	0.52 (0.38-0.66)	0.49 (0.33-0.65)	0.65 (0.47-0.83)	0.64 (0.36-0.92	0.65 (0.42-0.88)
GP Pair 2	0.42 (0.31-0.53)	0.45 (0.29-0.61)	0.40 (0.24-0.56)	0.63 (0.45-0.81)	0.62 (0.37-0.87)	0.63 (0.38-0.88)

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Table 2. Agreement on suitability for primary care, Kappa (95%CI)

DISCUSSION

Main findings

Our results suggest that on average four out of ten adults and children attending the ED could potentially be managed in primary care settings. While our study examined potential or likely management rather than actual management, it confirms the need to urgently review the current way of managing acutely unwell adults and children in the

NHS.[2] Differences between primary care and non-primary care cases were most pronounced over the need for specialist review or admission, rather than need for investigations. Agreement between GPs over which ED attenders could be seen in primary care is modest, but was higher for children than for adult patients. This superior agreement is preserved across broad categories of clinical presentations as described in presenting triage complaints and clinical data extracted from the triage histories. In general similar proportions of adult and paediatric attenders could be seen in primary care but there appears to be a stronger consensus over the paediatric cases.

Comparison with literature

Our results are similar to a New Zealand study which found equivalent level of agreement among clinicians about which patients could be managed in primary care with a retrospective case notes audit.[20] They found higher agreement among GPs than ED specialists over which patients would be appropriate for primary care, but did not explore patient factors that may influence levels of agreement. Although tools exist to help decide appropriateness for ED care from clinical records,[26] they have found similar proportions of cases deemed suitable for primary care as those found in our study relying on subjective judgement.[26] One older study using primary care physicians to rate case notes for primary care appropriateness did not explore the role of patient factors and reported lower levels of agreement (kappa = 0.34) even though raters had access to results of investigations and outcome of ED attendance.[27] Low levels of agreement among different professionals about appropriateness of different services for patients attending EDs and walk-in-centres have also been reported, but may be explained by the fact that different professional groups were used to determine consensus.[28]

The weak evidence base to inform urgent care service redesign has previously been highlighted in the Primary Care Foundation's report[23] and is confirmed in a more recent Cochrane review.[24] The triage model employed to appropriately select primary care patients amongst the incoming ED workstream is likely to be a critical factor in the success of introducing primary care services for patients who have already presented to an ED. However there is evidence that, in general, triage of ED patients varies depending on the individual assessing patients, even if formal triage systems are used.[29, 30] One alternative to selecting patients after ED attendance via triage is to

co-locate primary care services near EDs which enables patients to self-select for urgent primary care rather than attending the ED as it becomes easier to choose which service they feel is most appropriate given that they have made the decision to seek healthcare urgently. In an uncontrolled comparison, providing an out of hours primary care service near the ED in Maastricht resulted in 35% fewer ED attenders compared to another ED without similar primary care provision.[31]

Strengths and Limitations

The strengths of this study are that information on investigations undertaken and clinical outcomes were not provided, which reduces bias in the assessment of primary care appropriateness. Our findings therefore reflect the more realistic situation of a patient attending ED where this information is obviously not yet known. Our sample was random and included all ages, clinical presentations and severity of illness implying that our results are generalisable to the overall ED workstream. Nevertheless our study has some limitations. First, we do not have follow up data to determine the true level of agreement between GP assessment and subsequent clinical care, including for example the proportion of those considered appropriate for primary care who were sent home from ED or the proportion of those considered as needing admission who were admitted. Second, the sample of GPs was small and their individual clinical areas of expertise and comfort with different clinical presentations may not be representative of all primary care physicians and the definition of acceptability for primary care was left to individual judgement. This may be reflected in the modest levels of agreement that we found. Thirdly, ~~Finally~~ clinical data extracted from triage histories was incomplete in some cases which may have contributed to further variation in responses. Finally we did not ask the GPs if they considered other community based health professionals e.g. pharmacists as an appropriate choice of healthcare access given the clinical presentations. In addition, this study was done in one university hospital during one month of the year which may not generalise to other settings. Given the importance of these results we suggest that they are replicated in other settings to test generalizability.

Clinical and policy implications

Our results add to growing concerns that increasing numbers of patients attending ED services in the UK threaten not only patient care but also efforts to contain health care

spending. Even if the true proportion of adults and children currently seen in in ED who could be seen in primary care is less then the 43~~0~~% that our study estimated, it implies that a major restructuring of how urgent or emergency care is provided is urgently needed. This needs to include ways to potentially signpost patients more effectively, while simultaneously providing support for providing urgent primary care service (when daytime primary care is already under severe pressure), Importantly the need for investigations was not seen to be a barrier to primary care assessment. Generating consensus criteria to identify patients who can be managed in primary care, implementing these criteria, and measuring the effects on patient flow, health care costs, and patient satisfaction is a major priority.

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Ethical approval: none required

Contribution: MIWT, LMcC, EL conceived the study. CH, MT designed the study. MIWT, LMcC, EL collected the data. DSL contributed data, analysed the data and drafted the manuscript. All authors contributed to data interpretation, manuscript revisions and agreed the final manuscript.

References

1. Cowling TE, Cecil EV, Soljak MA, Lee JT, Millett C, Majeed A, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. PLoS One. 2013; **8**(6): e66699.
2. NHS England ~~N~~. Urgent and Emergency Care Review - Evidence Base Engagement Document. London: Department of Health; 2013.
3. Mills AM, Shofer FS, Chen EH, Hollander JE, Pines JM. The association between emergency department crowding and analgesia administration in acute abdominal pain patients. Acad Emerg Med. 2009; **16**(7): 603-8.
4. Lee CC, Lee NY, Chuang MC, Chen PL, Chang CM, Ko WC. The impact of overcrowding on the bacterial contamination of blood cultures in the ED. Am J Emerg Med. 2012; **30**(6): 839-45.
5. Collis J. Adverse effects of overcrowding on patient experience and care. Emerg Nurse. 2010; **18**(8): 34-9.
6. Sun BC, Hsia RY, Weiss RE, Zingmond D, Liang LJ, Han W, et al. Effect of emergency department crowding on outcomes of admitted patients. Ann Emerg Med. 2013; **61**(6): 605-11 e6.
7. Mason S, Weber EJ, Coster J, Freeman J, Locker T. Time patients spend in the emergency department: England's 4-hour rule-a case of hitting the target but missing the point? Ann Emerg Med. 2012; **59**(5): 341-9.
8. Ng Y, Lewena S. Leaving the paediatric emergency department without being seen: understanding the patient and the risks. J Paediatr Child Health. 2012; **48**(1): 10-5.
9. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med. 2008; **52**(2): 126-36.
10. van Uden CJ, Crebolder HF. Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? Emerg Med J. 2004; **21**(6): 722-3.
11. Benahmed N, Laokri S, Zhang WH, Verhaeghe N, Trybou J, Cohen L, et al. Determinants of nonurgent use of the emergency department for pediatric patients in 12 hospitals in Belgium. Eur J Pediatr. 2012; **171**(12): 1829-37.
12. Philips H, Remmen R, De Paepe P, Buylaert W, Van Royen P. Out of hours care: a profile analysis of patients attending the emergency department and the general practitioner on call. BMC Fam Pract. 2010; **11**: 88.
13. Koziol-McLain J, Price DW, Weiss B, Quinn AA, Honigman B. Seeking care for nonurgent medical conditions in the emergency department: through the eyes of the patient. J Emerg Nurs. 2000; **26**(6): 554-63.
14. Agarwal S, Banerjee J, Baker R, Conroy S, Hsu R, Rashid A, et al. Potentially avoidable emergency department attendance: interview study of patients' reasons for attendance. Emerg Med J. 2012; **29**(12): e3.
15. Gentile S, Vignally P, Durand AC, Gainotti S, Sambuc R, Gerbeaux P. Nonurgent patients in the emergency department? A French formula to prevent misuse. BMC Health Serv Res. 2010; **10**: 66.
16. Bury G, Hungerford P, Langton D, Plunkett P. A & E services in Ireland: the potential role of general practice in accident and emergency services. Ir J Med Sci. 2000; **169**(4): 245-7.
17. Kool RB, Homberg DJ, Kamphuis HC. Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands. BMC Health Serv Res. 2008; **8**: 225.
18. Lee A, Hazlett CB, Chow S, Lau FL, Kam CW, Wong P, et al. How to minimize inappropriate utilization of Accident and Emergency Departments: improve the validity of classifying the general practice cases amongst the A&E attendees. Health Policy. 2003; **66**(2): 159-68.
19. Huibers L, Thijssen W, Koetsenruijter J, Giesen P, Grol R, Wensing M. GP cooperative and emergency department: an exploration of patient flows. J Eval Clin Pract. 2013; **19**(2): 243-9.
20. Elley CR, Randall PJ, Bratt D, Freeman P. Can primary care patients be identified within an emergency department workload? N Z Med J. 2007; **120**(1256): U2583.
21. Dale J, Green J, Reid F, Glucksman E. Primary care in the accident and emergency department: I. Prospective identification of patients. BMJ. 1995; **311**(7002): 423-6.
22. Pileggi C, Raffaele G, Angelillo IF. Paediatric utilization of an emergency department in Italy. Eur J Public Health. 2006; **16**(5): 565-9.
23. Carson D, Stern R, Clay H. Urgent Care. A practical guide to transforming same-day care in general practice. Lewes, East Sussex: Primary Care Foundation; 2009.

24. Khangura JK, Flodgren G, Perera R, Rowe BH, Shepperd S. Primary care professionals providing non-urgent care in hospital emergency departments. Cochrane Database Syst Rev. 2012; **11**: CD002097.
25. Lowy A, Kohler B, Nicholl J. Attendance at accident and emergency departments: unnecessary or inappropriate? Journal of public health medicine. 1994; **16**(2): 134-40.
26. Sempere-Selva T, Peiro S, Sendra-Pina P, Martinez-Espin C, Lopez-Aguilera I. Inappropriate use of an accident and emergency department: magnitude, associated factors, and reasons--an approach with explicit criteria. Ann Emerg Med. 2001; **37**(6): 568-79.
27. Gribben B. General practitioners' assessments of the primary care caseload in Middlemore Hospital Emergency Department. N Z Med J. 2003; **116**(1169): U329.
28. Bickerton J, Davies J, Davies H, Apau D, Procter S. Streaming primary urgent care: a prospective approach. Prim Health Care Res Dev. 2012; **13**(2): 142-52.
29. Dallaire C, Poitras J, Aubin K, Lavoie A, Moore L. Emergency department triage: do experienced nurses agree on triage scores? J Emerg Med. 2012; **42**(6): 736-40.
30. Nakagawa J, Ouk S, Schwartz B, Schriger DL. Interobserver agreement in emergency department triage. Ann Emerg Med. 2003; **41**(2): 191-5.
31. van Uden CJ, Winkens RA, Wesseling G, Fiolet HF, van Schayck OC, Crebolder HF. The impact of a primary care physician cooperative on the caseload of an emergency department: the Maastricht integrated out-of-hours service. J Gen Intern Med. 2005; **20**(7): 612-7.

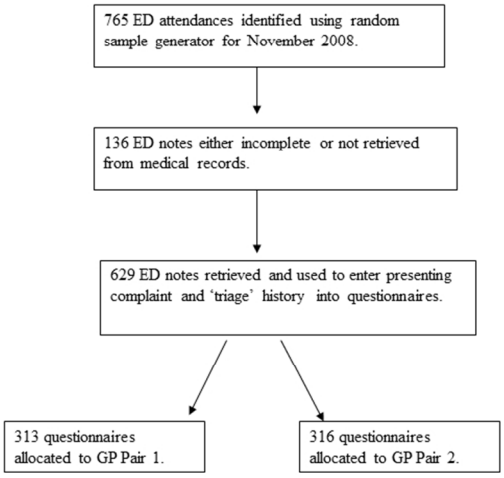

Figure 1. Selection of ED case notes reviewed by general practitioners

Selection of ED case notes reviewed by general practitioners
254x190mm (96 x 96 DPI)

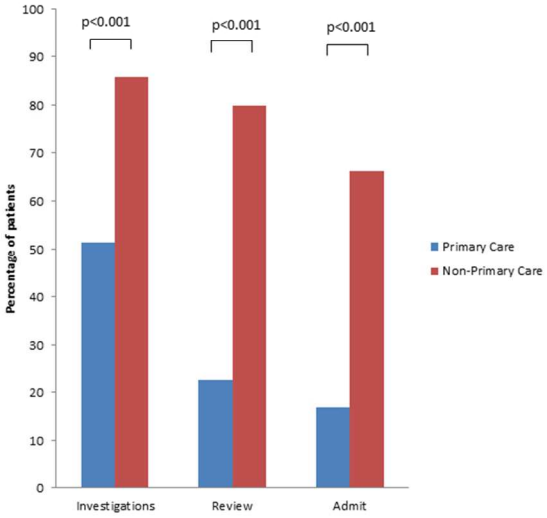

Figure 2. Percentage of patients considered suitable for primary care vs not suitable for primary care requiring investigations, specialist review or hospital admission

Percentage of patients considered suitable for primary care vs not suitable for primary care requiring investigations, specialist review or hospital admission
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BMJ open

Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records analysed in a service evaluation project.

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TITLE: Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records analysed in a service evaluation project.

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Key Words: Primary Care, Accident and Emergency Medicine, Audit, Organisation of Health Services

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ABSTRACT

Objectives: To assess the proportion of ED attendances that would be suitable for primary care and the inter-rater reliability of GP assessment of primary care suitability.

Design of Study: Survey of general practitioners' agreement of suitability for primary care on a random anonymised sample of all ED patients attending over a one month period.

Setting: Emergency Department of a UK Hospital serving a population of 600,000

Method: Four GPs independently used data extracted from clinical notes to rate appropriateness for management in primary care as well as need for investigations, specialist review or admission. Agreement was assessed using Cohen's Kappa

Results: The mean percentage of patients that GPs considered suitable for primary care management was 43% (range 38% to 47%). Kappa for agreement was 0.54 (95% CI 0.44 to 0.64) and 0.47(95% CI 0.38-0.59). In patients deemed not suitable for primary care, GPs were more likely to determine the need for specialist review (RR = 3.5, 95% CI 3.0 to 4.2, $p<0.001$) and admission (RR = 3.9, 95% CI 3.2 to 4.7, $p<0.001$). In patients assessed as suitable for primary care, GPs would initiate investigations in 51% of cases. Consensus over primary care appropriateness was higher for paediatric than adult attenders.

Conclusion: A significant number of patients attending ED could be managed by GPs, including those requiring investigations at triage. Stronger agreement among GPs over place of care may be seen for paediatric than for adult attenders. More effective signposting of patients presenting with acute or urgent problems, and supporting a greater role for primary care in relieving the severe workflow pressures in ED in the UK are potential solutions.

ARTICLE SUMMARY

ARTICLE FOCUS

- Emergency departments are under increasing pressure from large numbers of attenders
- A proportion of patients attending emergency departments could be assessed in primary care but there are no standard tools to appropriately select such patients
- We set out to establish the level of agreement among general practitioners over which patients attending emergency departments can be managed in primary care

KEY MESSAGES

- On average, 43% of emergency department attenders could be managed in primary care
- There was greater consensus among the general practitioners for initial location of urgent care for paediatric patients compared with adult patients
- The need for investigations did not deter general practitioners from assessing that patients could initially be seen in primary care

STRENGTHS AND LIMITATIONS

- The sample of records was randomly generated and the general practitioners did not know the outcome of the patient attendance
- The number of general practitioners was small and the audit was carried out in one healthcare setting, which limits generalizability of our results
- The definition of acceptability for primary care was made subjectively by the general practitioners

INTRODUCTION

There has been a substantial increase in the number of patients attending hospital emergency departments (EDs) over the last six years in England.[1] The delivery of emergency healthcare in England is under significant threat currently, partly due to rising demand, and improvements to emergency care provision is now a major NHS priority.[2] Overcrowding in EDs is associated with delays in initiating treatment,[3] deficiencies in the processes of care,[4] a poorer patient experience[5] and higher mortality in patients who are subsequently admitted.[6] The introduction of the four hour wait limit for patients in EDs in England reduced the average waiting time for treatment and discharge,[7] which in itself reduces the risk of harm experienced by patients who leave without being seen due to long waits[8], but there are substantial pressures on the capacity of ED staff to continue to deliver this standard of care.[2]

The cross-sectional association between less timely access to primary care and greater rates of self-referred discharged ED attendances[1] implies that a proportion of those attending can be managed in primary care. Although a review of causes of overcrowding in EDs suggest that delay in transfer of admitted patients to a hospital ward is important,[9] there is evidence that demand can be reduced by increasing access to primary care outside normal office hours, from a study in the Netherlands in 2001/2002 using a before and after design.[10] However, given the multiple reasons for attendance at EDs with non-urgent problems[11-14] there is no clear intervention that can be implemented prior to attendance. Therefore a number of interventions designed for patients who present with non-urgent problems have been trialled within EDs, such as signposting to primary care[15] or employing primary care physicians (general practitioners; GPs).[16, 17]

Accurate identification of non-urgent cases in EDs for either re-direction to primary care or to be seen within EDs by a GP could improve cost effectiveness of emergency care,[18] particularly as some studies suggest that non-urgent presentations receive less investigations and follow up if managed by a GP.[19] However, there is no consensus over how best to screen for non-urgent presentations at triage[20]. Nevertheless,

estimates of the proportion of patients who attend EDs who could be safely and appropriately managed in primary care are around 30% for both adults[21] and children.[22] Furthermore, in settings where EDs offer direct access to a GP, audits suggest that between 10% and 30% of overall attendances can be managed by a GP.[23]

Although incorporating primary care services within EDs offers the potential for improved patient flow and reduced costs, a Cochrane review of primary care services in EDs concluded the evidence base is currently too weak to make recommendations as only three non-randomised studies were included.[24] Our aim in this study was to measure the level of agreement among primary care physicians about who could be appropriately managed in primary care, within different groups of patients (based on age range or clinical categories of trauma, medicine or surgery) and to assess whether agreement differed between these groups.

METHODS

The John Radcliffe Hospital emergency department is a consultant-led, 24 hour service with full resuscitation facilities without a co-located urgent care centre or nearby walk-in centre. This ED has an annual attendance of 120,000 and is the only ED for the city of Oxford and referral centre for surrounding population of 600,000. We developed a pilot data extraction tool based on that used by Lowy et al[25] using information from the initial ED presentation of adult and child patients, including demographics, reason for presentation and triage nurse assessment on an initial 20 cases. Two GPs considered that this information was sufficient to reach decisions about whether the patient appeared to be suitable for management in a primary care setting, and if not whether they would be likely to need further investigations, referral or hospital care.

A random sample generator was used to select cases from ED attenders to the John Radcliffe Hospital in Oxford, UK, each day for a one month period, November 2008. All attendances were used as a sampling frame, covering all ages and the 24 hour opening of the department. We extracted data that had been established as satisfactory in the pilot for GP decision making from the record documented by a triage nurse, and transferred this to an electronic questionnaire. We identified four primary care physicians, who had been fully accredited for more than 2 years and spend at least

50% of their professional time in routine general practice, to assess the cases. Two physician pairs each assessed half the sample. Each case was assessed independently by each physician for 1) appropriateness for primary care management; 2) need for investigations; 3) need for specialist review (without admission) and 4) need for hospital admission. Responses were limited to 'yes', 'no' and 'unsure'.

We powered the study to test the hypothesis that the level of agreement between a physician pair was substantial (kappa 0.8) compared to moderate (Kappa 0.6) based on a probability of 50% of cases determined appropriate for primary care management. For an alpha of 0.05, with 80% power we required a sample which equalled 765 in total.

Raw agreement results are presented as proportions and ranges. Responses were dichotomised to 'yes' versus 'no' and 'unsure', to conservatively estimate those suitable for primary care management. Agreement was assessed using Cohen's Kappa using SPSS (version 17.0) for the overall sample and in clinical sub groups of age (adult versus paediatric), and broad categories of specialties (trauma, medical, surgical). Differences between proportions of primary and non-primary care cases requiring investigations, review or admission were summarised with relative risks (RR) and z tests used to assess significance of difference.

This study was conducted as a service evaluation and data were obtained primarily for audit purposes according to the guidance from the Oxford Radcliffe Hospital Trust audit policies. In accordance with the guidance for research in place at the time the study was conducted, research ethics approval was not required for service evaluations such as this study. All personnel involved in handling data were employees of the hospital trust or (then) primary care trust. Data were anonymised and treated according to the standard operating procedures for patient data in place at the Trust and the University of Oxford Department of Primary Care.

RESULTS

Of the 765 case notes retrieved, 629 (82%) contained sufficient information to include in the sample questionnaire (figure 1). Of the total, 25% were children (<16 years old)

and 57% were triaged to the 'Minor Injuries' area of the ED on initial presentation. From the information presented in the electronic questionnaire, the GPs were able to make a decision on suitable location of management in 88% of cases (1017 /1258 responses).

The mean percentage of patients that GPs considered suitable for primary care management was 43%(range 38% to 47%). Table 1 shows that agreement for this initial question for pair 1 gave a kappa of 0.54 (95% CI 0.44 to 0.64) and for pair 2, 0.47 (95% CI 0.38 to 0.59).

Kappa (95% CI)	Suitable for primary care.	Further investigations required.	Hospital review required.	Hospital admission required.
GP Pair 1	0.54 (0.44 – 0.64)	0.41 (0.31 – 0.51)	0.35 (0.2 – 0.51)	0.22 (0.002 – 0.445)
GP Pair 2	0.47 (0.38 – 0.59)	0.49 (0.39 – 0.59)	0.31 (0.19 – 0.43)	0.48 (0.32 – 0.64)

Table 1. Levels of agreement between primary care physician pairs, Kappa (95%CI).

Figure 2 shows that in cases deemed suitable for primary care management, significantly fewer patients were deemed to require investigations, specialist review or admission compared to ED cases or where physicians were unsure of the appropriate setting (figure 2). Among patients considered unsuitable for primary care management, GPs were almost four times as likely to determine the need for specialist review (80% vs. 23%, RR = 3.5, 95% CI 3.0 to 4.2, $p<0.001$) and for admission (66% vs. 17% RR = 3.9, 95% CI 3.2 to 4.7, $p<0.001$) when compared with patients considered suitable for primary care. Patients considered unsuitable for management in primary care were also more likely to need investigations compared with primary care cases (86% vs. 51%, RR = 1.7 95% CI 1.5 to 1.8, $p<0.001$).

The mean percentage of patients that GPs considered suitable for primary care management was 42% in adults (range 36% to 49%) and 48% in children (range 40%

to 57%). Table 2 shows that the strength of agreement was consistently higher for children across the clinical categories of trauma (kappa 0.62 to 0.64) and medical and surgical presentations (kappa 0.63 to 0.65)

Kappa (95% CI)	All adults	Adult trauma	Adult medicine/ surgery	All paediatrics	Paediatric trauma	Paediatric medicine/ surgery
GP Pair 1	0.50 (0.39-0.61)	0.52 (0.38-0.66)	0.49 (0.33-0.65)	0.65 (0.47-0.83)	0.64 (0.36-0.92	0.65 (0.42-0.88)
GP Pair 2	0.42 (0.31-0.53)	0.45 (0.29-0.61)	0.40 (0.24-0.56)	0.63 (0.45-0.81)	0.62 (0.37-0.87)	0.63 (0.38-0.88)

Table 2. Agreement on suitability for primary care, Kappa (95%CI)

DISCUSSION

Main findings

Our results suggest that on average four out of ten adults and children attending the ED could potentially be managed in primary care settings. While our study examined potential or likely management rather than actual management, it confirms the need to urgently review the current way of managing acutely unwell adults and children in the NHS.[2] Differences between cases considered appropriate for primary care compared with those appropriate for the emergency department were most pronounced over the need for specialist review or admission, rather than need for investigations. Agreement between GPs over which ED attenders could be managed in primary care is modest, but was higher for children than for adult patients. This superior agreement is preserved across broad categories of clinical presentations as described in presenting triage complaints and clinical data extracted from the triage histories. In general similar proportions of adult and paediatric attenders could be seen in primary care but there appears to be a stronger consensus over the paediatric cases. The fact that agreement among experienced GPs is not high demonstrates that accurate assessment is difficult for individual patients and this needs to be considered in the design of future interventions.

Comparison with literature

Our results are similar to a New Zealand study which found equivalent level of agreement among clinicians about which patients could be managed in primary care with a retrospective case notes audit.[20] They found higher agreement among GPs than ED specialists over which patients would be appropriate for primary care, but did not explore patient factors that may influence levels of agreement. Although tools exist to help decide appropriateness for ED care from clinical records,[26] they have found similar proportions of cases deemed suitable for primary care as those found in our study relying on subjective judgement.[26] One older study using primary care physicians to rate case notes for primary care appropriateness did not explore the role of patient factors and reported lower levels of agreement (kappa = 0.34) even though raters had access to results of investigations and outcome of ED attendance.[27] Low levels of agreement among different professionals about appropriateness of different services for patients attending EDs and walk-in-centres have also been reported, but may be explained by the fact that different professional groups were used to determine consensus.[28]

The weak evidence base to inform urgent care service redesign has previously been highlighted in the Primary Care Foundation's report[23] and is confirmed in a more recent Cochrane review.[24] The triage model employed to appropriately select primary care patients amongst the incoming ED workstream is likely to be a critical factor in the success of introducing primary care services for patients who have already presented to an ED. However there is evidence that, in general, triage of ED patients varies depending on the individual assessing patients, even if formal triage systems are used.[29, 30] One alternative to selecting patients after ED attendance via triage is to co-locate primary care services near EDs which enables patients to self-select for urgent primary care rather than attending the ED as it becomes easier to choose which service they feel is most appropriate given that they have made the decision to seek healthcare urgently. In an uncontrolled comparison, providing an out of hours primary care service near the ED in Maastricht resulted in 35% fewer ED attenders compared to another ED without similar primary care provision.[31]

Strengths and Limitations

The strengths of this study are that information on investigations undertaken and clinical outcomes were not provided, which reduces bias in the assessment of primary care appropriateness. Our findings therefore reflect the more realistic situation of a patient attending ED where this information is obviously not yet known. Our sample was random and included all ages, clinical presentations and severity of illness implying that our results are generalisable to the overall ED workstream. Nevertheless our study has some limitations. First, we do not have follow up data to determine the true level of agreement between GP assessment and subsequent clinical care, including for example the proportion of those considered appropriate for primary care who were sent home from ED or the proportion of those considered as needing admission who were admitted. Second, the sample of GPs was small and their individual clinical areas of expertise and comfort with different clinical presentations may not be representative of all primary care physicians and the definition of acceptability for primary care was left to individual judgement. This may be reflected in the modest levels of agreement that we found. Thirdly clinical data extracted from triage histories was incomplete in some cases which may have contributed to further variation in responses. Finally we did not ask the GPs if they considered other community based health professionals e.g. pharmacists as an appropriate choice of healthcare access given the clinical presentations. In addition, this study was done in one university hospital during one month of the year which may not generalise to other settings. Given the importance of these results we suggest that they are replicated in other settings to test generalizability.

Clinical and policy implications

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Ethical approval: none required

Contribution: MIWT, LMcC, EL conceived the study. CH, MT designed the study. MIWT, LMcC, EL collected the data. DSL contributed data, analysed the data and drafted the manuscript. All authors contributed to data interpretation, manuscript revisions and agreed the final manuscript.

References

1. Cowling TE, Cecil EV, Soljak MA, Lee JT, Millett C, Majeed A, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. PLoS One. 2013; **8**(6): e66699.
2. NHS England. Urgent and Emergency Care Review - Evidence Base Engagement Document. London: Department of Health; 2013.
3. Mills AM, Shofer FS, Chen EH, Hollander JE, Pines JM. The association between emergency department crowding and analgesia administration in acute abdominal pain patients. Acad Emerg Med. 2009; **16**(7): 603-8.
4. Lee CC, Lee NY, Chuang MC, Chen PL, Chang CM, Ko WC. The impact of overcrowding on the bacterial contamination of blood cultures in the ED. Am J Emerg Med. 2012; **30**(6): 839-45.
5. Collis J. Adverse effects of overcrowding on patient experience and care. Emerg Nurse. 2010; **18**(8): 34-9.
6. Sun BC, Hsia RY, Weiss RE, Zingmond D, Liang LJ, Han W, et al. Effect of emergency department crowding on outcomes of admitted patients. Ann Emerg Med. 2013; **61**(6): 605-11 e6.

7. Mason S, Weber EJ, Coster J, Freeman J, Locker T. Time patients spend in the emergency department: England's 4-hour rule-a case of hitting the target but missing the point? Ann Emerg Med. 2012; **59**(5): 341-9.
8. Ng Y, Lewena S. Leaving the paediatric emergency department without being seen: understanding the patient and the risks. J Paediatr Child Health. 2012; **48**(1): 10-5.
9. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med. 2008; **52**(2): 126-36.
10. van Uden CJ, Crebolder HF. Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? Emerg Med J. 2004; **21**(6): 722-3.
11. Agarwal S, Banerjee J, Baker R, Conroy S, Hsu R, Rashid A, et al. Potentially avoidable emergency department attendance: interview study of patients' reasons for attendance. Emerg Med J. 2012; **29**(12): e3.
12. Benahmed N, Laokri S, Zhang WH, Verhaeghe N, Trybou J, Cohen L, et al. Determinants of nonurgent use of the emergency department for pediatric patients in 12 hospitals in Belgium. Eur J Pediatr. 2012; **171**(12): 1829-37.
13. Philips H, Remmen R, De Paepe P, Buylaert W, Van Royen P. Out of hours care: a profile analysis of patients attending the emergency department and the general practitioner on call. BMC Fam Pract. 2010; **11**: 88.
14. Koziol-McLain J, Price DW, Weiss B, Quinn AA, Honigman B. Seeking care for nonurgent medical conditions in the emergency department: through the eyes of the patient. J Emerg Nurs. 2000; **26**(6): 554-63.
15. Gentile S, Vignally P, Durand AC, Gainotti S, Sambuc R, Gerbeaux P. Nonurgent patients in the emergency department? A French formula to prevent misuse. BMC Health Serv Res. 2010; **10**: 66.
16. Bury G, Hungerford P, Langton D, Plunkett P. A & E services in Ireland: the potential role of general practice in accident and emergency services. Ir J Med Sci. 2000; **169**(4): 245-7.
17. Kool RB, Homberg DJ, Kamphuis HC. Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands. BMC Health Serv Res. 2008; **8**: 225.
18. Lee A, Hazlett CB, Chow S, Lau FL, Kam CW, Wong P, et al. How to minimize inappropriate utilization of Accident and Emergency Departments: improve the validity of classifying the general practice cases amongst the A&E attendees. Health Policy. 2003; **66**(2): 159-68.
19. Huibers L, Thijssen W, Koetsenruijter J, Giesen P, Grol R, Wensing M. GP cooperative and emergency department: an exploration of patient flows. J Eval Clin Pract. 2013; **19**(2): 243-9.
20. Elley CR, Randall PJ, Bratt D, Freeman P. Can primary care patients be identified within an emergency department workload? N Z Med J. 2007; **120**(1256): U2583.
21. Dale J, Green J, Reid F, Glucksman E. Primary care in the accident and emergency department: I. Prospective identification of patients. BMJ. 1995; **311**(7002): 423-6.
22. Pileggi C, Raffaele G, Angelillo IF. Paediatric utilization of an emergency department in Italy. Eur J Public Health. 2006; **16**(5): 565-9.
23. Carson D, Stern R, Clay H. Urgent Care. A practical guide to transforming same-day care in general practice. Lewes, East Sussex: Primary Care Foundation; 2009.
24. Khangura JK, Flodgren G, Perera R, Rowe BH, Shepperd S. Primary care professionals providing non-urgent care in hospital emergency departments. Cochrane Database Syst Rev. 2012; **11**: CD002097.
25. Lowy A, Kohler B, Nicholl J. Attendance at accident and emergency departments: unnecessary or inappropriate? Journal of public health medicine. 1994; **16**(2): 134-40.
26. Sempere-Selva T, Peiro S, Sendra-Pina P, Martinez-Espin C, Lopez-Aguilera I. Inappropriate use of an accident and emergency department: magnitude, associated factors, and reasons--an approach with explicit criteria. Ann Emerg Med. 2001; **37**(6): 568-79.
27. Gribben B. General practitioners' assessments of the primary care caseload in Middlemore Hospital Emergency Department. N Z Med J. 2003; **116**(1169): U329.
28. Bickerton J, Davies J, Davies H, Apau D, Procter S. Streaming primary urgent care: a prospective approach. Prim Health Care Res Dev. 2012; **13**(2): 142-52.
29. Dallaire C, Poitras J, Aubin K, Lavoie A, Moore L. Emergency department triage: do experienced nurses agree on triage scores? J Emerg Med. 2012; **42**(6): 736-40.
30. Nakagawa J, Ouk S, Schwartz B, Schriger DL. Interobserver agreement in emergency department triage. Ann Emerg Med. 2003; **41**(2): 191-5.
31. van Uden CJ, Winkens RA, Wesseling G, Fiolet HF, van Schayck OC, Crebolder HF. The impact of a primary care physician cooperative on the caseload of an emergency department: the Maastricht integrated out-of-hours service. J Gen Intern Med. 2005; **20**(7): 612-7.

TITLE: Suitability of emergency department attenders to be assessed in primary care: survey of general practitioner agreement in a random sample of triage records analysed in a service evaluation project.

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ABSTRACT

Objectives: To assess the proportion of ED attendances that would be suitable for primary care and the inter-rater reliability of GP assessment of primary care suitability.

Design of Study: Survey of general practitioners' agreement of suitability for primary care on a random anonymised sample of all ED patients attending over a one month period.

Setting: Emergency Department of a UK Hospital serving a population of 600,000

Method: Four GPs independently used data extracted from clinical notes to rate appropriateness for ~~treatment~~ management in primary care as well as need for investigations, specialist review or admission. Agreement was assessed using Cohen's Kappa

Results: The mean percentage of patients that GPs considered suitable for primary care management was 43%~~Mean GP rating of appropriateness for primary care treatment was 43%~~ (range 38% to 47%). Kappa for agreement was 0.54 (95% CI 0.44 to 0.64) and 0.47(95% CI 0.38-0.59). In patients deemed not suitable for primary care, GPs were more likely to determine the need for specialist review (RR = 3.5, 95% CI 3.0 to 4.2, p<0.001) and admission (RR = 3.9, 95% CI 3.2 to 4.7, p<0.001). In patients assessed as suitable for primary care, GPs would initiate investigations in 51% of cases. Consensus over primary care appropriateness was higher for ~~children~~ paediatric than adult attenders.

Conclusion: A significant number of patients attending ED could be managed by GPs, including those requiring investigations at triage. Stronger agreement among GPs over place of care may be seen for paediatric than for adult attenders. More effective signposting of patients presenting with acute or urgent problems, and supporting a greater role for primary care in relieving the severe workflow pressures in ED in the UK are potential solutions.

ARTICLE SUMMARY

ARTICLE FOCUS

- Emergency departments are under increasing pressure from large numbers of attenders
- A proportion of patients attending emergency departments could be assessed in primary care but there are no standard tools to appropriately select such patients
- We set out to establish the level of agreement among general practitioners over which patients attending emergency departments can be ~~seen~~ managed in primary care

KEY MESSAGES

- On average, 43% of emergency department attenders could be ~~seen~~ managed in primary care
- There was greater consensus among the general practitioners for initial location of urgent care for paediatric patients compared with adult patients
- The need for investigations did not deter general practitioners from assessing that patients could initially be seen in primary care

STRENGTHS AND LIMITATIONS

- The sample of records was randomly generated and the general practitioners did not know the outcome of the patient attendance

- The number of general practitioners was small and the audit was carried out in one healthcare setting, which limits generalizability of our results
- The definition of acceptability for primary care was made subjectively by the general practitioners

INTRODUCTION

There has been a substantial increase in the number of patients attending hospital emergency departments (EDs) over the last six years in England.[1] The delivery of emergency healthcare in England is under significant threat currently, partly due to rising demand, and improvements to emergency care provision is now a major NHS priority.[2] Overcrowding in EDs is associated with delays in initiating treatment,[3] deficiencies in the processes of care,[4] a poorer patient experience[5] and higher mortality in patients who are subsequently admitted.[6] The introduction of the four hour wait limit for patients in EDs in England reduced the average waiting time for treatment and discharge,[7] which in itself reduces the risk of harm experienced by patients who leave without being seen due to long waits[8], but there are substantial pressures on the capacity of ED staff to continue to deliver this standard of care.[2]

The cross-sectional association between less timely access to primary care and greater rates of self-referred discharged ED attendances[1] implies that a proportion of those attending can be managed in primary care. Although a review of causes of overcrowding in EDs suggest that delay in transfer of admitted patients to a hospital ward is important,[9] there is evidence that demand can be reduced by increasing access to primary care outside normal office hours, from a study in the Netherlands in 2001/2002 using a before and after design.[10] However, given the multiple reasons for attendance at EDs with non-urgent problems[11-14] there is no clear intervention that can be implemented prior to attendance. Therefore a number of interventions designed for

patients who present with non-urgent problems have been trialled within EDs, such as signposting to primary care[15] or employing primary care physicians (general practitioners; GPs).[16, 17]

Accurate identification of non-urgent cases in EDs for either re-direction to primary care or to be seen within EDs by a GP could improve cost effectiveness of emergency care,[18] particularly as some studies suggest that non-urgent presentations receive less investigations and follow up if managed by a GP.[19] However, there is no consensus over how best to screen for non-urgent presentations at triage[20]. Nevertheless, estimates of the proportion of patients who attend EDs who could be safely and appropriately managed in primary care are around 30% for both adults[21] and children.[22] Furthermore, in settings where EDs offer direct access to a GP, audits suggest that between 10% and 30% of overall attendances can be managed by a GP.[23]

Although incorporating primary care services within EDs offers the potential for improved patient flow and reduced costs, a Cochrane review of primary care services in EDs concluded the evidence base is currently too weak to make recommendations as only three non-randomised studies were included.[24] Our aim in this study was to measure the level of agreement among primary care physicians about who could be appropriately managed in primary care, within different groups of patients (based on age range or clinical categories of trauma, medicine or surgery) and to assess whether agreement differed between these groups.

METHODS

The John Radcliffe Hospital emergency department is a consultant-led, 24 hour service with full resuscitation facilities without a co-located urgent care centre or nearby walk-in centre. This ED has an annual attendance of 120,000 and is the only ED for the city of Oxford and referral centre for surrounding population of 600,000. We developed a pilot data extraction tool based on that used by Lowy et al[25] using information from the initial ED presentation of adult and child patients, including demographics, reason for presentation and triage nurse assessment on an initial 20 cases. Two GPs ~~demonstrated~~ considered that this information was sufficient to reach decisions about whether the patient appeared to be suitable for management in a

primary care setting, and if not whether they would be likely to need further investigations, referral or hospital care.

A random sample generator was used to select cases from ED attenders to the John Radcliffe Hospital in Oxford, UK, each day for a one month period, November 2008. ~~This ED has an annual attendance of 120,000 and is the only ED for the city of Oxford and referral centre for surrounding population of 600,000.~~ All attendances were used as a sampling frame, covering all ages and the 24 hour opening of the department. We extracted data that had been established as satisfactory in the pilot for GP decision making from the record documented by a triage nurse, and transferred this to an electronic questionnaire. We identified four primary care physicians, who had been fully accredited for more than 2 years and spend at least 50% of their professional time in routine general practice, to assess the cases. Two physician pairs each assessed half the sample. Each case was assessed independently by each physician for 1) appropriateness for primary care management; 2) need for investigations; 3) need for specialist review (without admission) and 4) need for hospital admission. Responses were limited to 'yes', 'no' and 'unsure'.

We powered the study to test the hypothesis that the level of agreement between a physician pair was substantial (kappa 0.8) compared to moderate (Kappa 0.6) based on a probability of 50% of cases determined appropriate for primary care management. For an alpha of 0.05, with 80% power we required a sample which equalled 765 in total.

Raw agreement results are presented as proportions and ranges. Responses were dichotomised to 'yes' versus 'no' and 'unsure', to conservatively estimate those suitable for primary care management. Agreement was assessed using Cohen's Kappa using SPSS (version 17.0) for the overall sample and in clinical sub groups of age (adult versus paediatric), and broad categories of specialties (trauma, medical, surgical). Differences between proportions of primary and non-primary care cases requiring investigations, review or admission were summarised with relative risks (RR) and z tests used to assess significance of difference.

This study was conducted as a service evaluation and data were obtained primarily for audit purposes according to the guidance from the Oxford Radcliffe Hospital Trust audit policies. In accordance with the guidance for research in place at the time the study was conducted, research ethics approval was not required for service evaluations such as this study. All personnel involved in handling data were employees of the hospital trust or (then) primary care trust. Data were anonymised and treated according to the standard operating procedures for patient data in place at the Trust and the University of Oxford Department of Primary Care.

RESULTS

Of the 765 case notes retrieved, 629 (82%) contained sufficient information to include in the sample questionnaire (figure 1). Of the total, 25% were children (<16 years old) and 57% were triaged to the 'Minor Injuriess' area of the ED on initial presentation. !From the information presented in the electronic questionnaireFrom the clinical information presented, the GPs were able to make a decision on suitable location of management in 88% of cases (1017 /n=1258 responses).

The mean percentage of patients that GPs considered suitable for primary care management was 43%The mean GP assessment of ED attendances suitable for primary care management was 43% (range 38% to 47%). Table 1 shows that agreement for this initial question for pair 1 gave a kappa of 0.54 (95% CI 0.44 to 0.64) and for pair 2, 0.47 (95% CI 0.38 to 0.59).

Kappa (95% CI)	Suitable for primary care.	Further investigations required.	Hospital review required.	Hospital admission required.
GP Pair 1	0.54 (0.44 – 0.64)	0.41 (0.31 – 0.51)	0.35 (0.2 – 0.51)	0.22 (0.002 – 0.445)
GP Pair 2	0.47 (0.38 – 0.59)	0.49 (0.39 – 0.59)	0.31 (0.19 – 0.43)	0.48 (0.32 – 0.64)

Table 1. Levels of agreement between primary care physician pairs, Kappa (95%CI).

Figure 2 shows that in cases deemed suitable for primary care management, significantly fewer patients were deemed to require investigations, specialist review or admission compared to ED cases or where physicians were unsure of the appropriate setting (figure 2). Among patients considered unsuitable for primary care management, GPs were almost four times as likely to determine the need for specialist review (80% vs. 23%, RR = 3.5, 95% CI 3.0 to 4.2, p<0.001) and for admission (66% vs. 17% RR = 3.9, 95% CI 3.2 to 4.7, p<0.001) when compared with patients considered suitable for primary care. Patients considered unsuitable for management in primary care were also more likely to need investigations compared with primary care cases (86% vs. 51%, RR = 1.7 95% CI 1.5 to 1.8, p<0.001).

The mean percentage of patients that GPs considered suitable for primary care management was~~The mean GP assessment on suitability for primary care management was~~ 42% in adults (range 36% to 49%) and 48% in children (range 40% to 57%). Table 2 shows that the strength of agreement was consistently higher for children across the clinical categories of trauma (kappa 0.62 to 0.64) and medical and surgical presentations (kappa 0.63 to 0.65)

Kappa (95% CI)	All adults	Adult trauma	Adult medicine/ surgery	All paediatrics	Paediatric trauma	Paediatric medicine/ surgery
GP Pair 1	0.50 (0.39-0.61)	0.52 (0.38-0.66)	0.49 (0.33-0.65)	0.65 (0.47-0.83)	0.64 (0.36-0.92	0.65 (0.42-0.88)
GP Pair 2	0.42 (0.31-0.53)	0.45 (0.29-0.61)	0.40 (0.24-0.56)	0.63 (0.45-0.81)	0.62 (0.37-0.87)	0.63 (0.38-0.88)

Table 2. Agreement on suitability for primary care, Kappa (95%CI)

DISCUSSION

Main findings

Our results suggest that on average four out of ten adults and children attending the ED could potentially be managed in primary care settings. While our study examined potential or likely management rather than actual management, it confirms the need to urgently review the current way of managing acutely unwell adults and children in the NHS.[2] Differences between cases considered appropriate for primary care compared with those appropriate for the emergency department ~~and non-primary care cases~~ were most pronounced over the need for specialist review or admission, rather than need for investigations. Agreement between GPs over which ED attenders could be ~~seen~~ managed in primary care is modest, but was higher for children than for adult patients. This superior agreement is preserved across broad categories of clinical presentations as described in presenting triage complaints and clinical data extracted from the triage histories. In general similar proportions of adult and paediatric attenders could be seen in primary care but there appears to be a stronger consensus over the paediatric cases. The fact that agreement among experienced GPs is not high demonstrates that accurate assessment is difficult for individual patients and this needs to be considered in the design of future interventions.

Comparison with literature

Our results are similar to a New Zealand study which found equivalent level of agreement among clinicians about which patients could be managed in primary care with a retrospective case notes audit.[20] They found higher agreement among GPs than ED specialists over which patients would be appropriate for primary care, but did not explore patient factors that may influence levels of agreement. Although tools exist to help decide appropriateness for ED care from clinical records,[26] they have found similar proportions of cases deemed suitable for primary care as those found in our study relying on subjective judgement.[26] One older study using primary care physicians to rate case notes for primary care appropriateness did not explore the role of patient factors and reported lower levels of agreement (kappa = 0.34) even though raters had access to results of investigations and outcome of ED attendance.[27] Low levels of agreement among different professionals about appropriateness of different services for patients attending EDs and walk-in-centres have also been reported, but may be explained by the fact that different professional groups were used to determine consensus.[28]

The weak evidence base to inform urgent care service redesign has previously been highlighted in the Primary Care Foundation's report[23] and is confirmed in a more recent Cochrane review.[24] The triage model employed to appropriately select primary care patients amongst the incoming ED workstream is likely to be a critical factor in the success of introducing primary care services for patients who have already presented to an ED. However there is evidence that, in general, triage of ED patients varies depending on the individual assessing patients, even if formal triage systems are used.[29, 30] One alternative to selecting patients after ED attendance via triage is to co-locate primary care services near EDs which enables patients to self-select for urgent primary care rather than attending the ED as it becomes easier to choose which service they feel is most appropriate given that they have made the decision to seek healthcare urgently. In an uncontrolled comparison, providing an out of hours primary care service near the ED in Maastricht resulted in 35% fewer ED attenders compared to another ED without similar primary care provision.[31]

Strengths and Limitations

The strengths of this study are that information on investigations undertaken and clinical outcomes were not provided, which reduces bias in the assessment of primary care appropriateness. Our findings therefore reflect the more realistic situation of a patient attending ED where this information is obviously not yet known. Our sample was random and included all ages, clinical presentations and severity of illness implying that our results are generalisable to the overall ED workstream. Nevertheless our study has some limitations. First, we do not have follow up data to determine the true level of agreement between GP assessment and subsequent clinical care, including for example the proportion of those considered appropriate for primary care who were sent home from ED or the proportion of those considered as needing admission who were admitted. Second, the sample of GPs was small and their individual clinical areas of expertise and comfort with different clinical presentations may not be representative of all primary care physicians and the definition of acceptability for primary care was left to individual judgement. This may be reflected in the modest levels of agreement that we found. Thirdly clinical data extracted from triage histories was incomplete in some cases which may have contributed to further variation in responses. Finally we did not ask the GPs if they considered other community based health professionals e.g. pharmacists as an appropriate choice of

healthcare access given the clinical presentations. In addition, this study was done in one university hospital during one month of the year which may not generalise to other settings. Given the importance of these results we suggest that they are replicated in other settings to test generalizability.

Clinical and policy implications

Our results add to growing concerns that increasing numbers of patients attending ED services in the UK threaten not only patient care but also efforts to contain health care spending. Even if the true proportion of adults and children currently seen in in ED who could be seen in primary care is less than the 43% that our study estimated, it implies that a major restructuring of how urgent or emergency care is provided is urgently needed. This needs to include ways to potentially signpost patients more effectively, while simultaneously providing support for providing urgent primary care service (when daytime primary care is already under severe pressure), Importantly the need for investigations was not seen to be a barrier to primary care assessment. Generating consensus criteria to identify patients who can be managed in primary care, implementing these criteria, and measuring the effects on patient flow, health care costs, and patient satisfaction is a major priority.

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Ethical approval: none required

Contribution: MIWT, LMcC, EL conceived the study. CH, MT designed the study. MIWT, LMcC, EL collected the data. DSL contributed data, analysed the data and drafted the manuscript. All authors contributed to data interpretation, manuscript revisions and agreed the final manuscript.

References

1. Cowling TE, Cecil EV, Soljak MA, Lee JT, Millett C, Majeed A, et al. Access to primary care and visits to emergency departments in England: a cross-sectional, population-based study. PLoS One. 2013; **8**(6): e66699.
2. NHS England. Urgent and Emergency Care Review - Evidence Base Engagement Document. London: Department of Health; 2013.
3. Mills AM, Shofer FS, Chen EH, Hollander JE, Pines JM. The association between emergency department crowding and analgesia administration in acute abdominal pain patients. Acad Emerg Med. 2009; **16**(7): 603-8.
4. Lee CC, Lee NY, Chuang MC, Chen PL, Chang CM, Ko WC. The impact of overcrowding on the bacterial contamination of blood cultures in the ED. Am J Emerg Med. 2012; **30**(6): 839-45.
5. Collis J. Adverse effects of overcrowding on patient experience and care. Emerg Nurse. 2010; **18**(8): 34-9.
6. Sun BC, Hsia RY, Weiss RE, Zingmond D, Liang LJ, Han W, et al. Effect of emergency department crowding on outcomes of admitted patients. Ann Emerg Med. 2013; **61**(6): 605-11 e6.
7. Mason S, Weber EJ, Coster J, Freeman J, Locker T. Time patients spend in the emergency department: England's 4-hour rule-a case of hitting the target but missing the point? Ann Emerg Med. 2012; **59**(5): 341-9.
8. Ng Y, Lewena S. Leaving the paediatric emergency department without being seen: understanding the patient and the risks. J Paediatr Child Health. 2012; **48**(1): 10-5.
9. Hoot NR, Aronsky D. Systematic review of emergency department crowding: causes, effects, and solutions. Ann Emerg Med. 2008; **52**(2): 126-36.
10. van Uden CJ, Crebolder HF. Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? Emerg Med J. 2004; **21**(6): 722-3.
11. Agarwal S, Banerjee J, Baker R, Conroy S, Hsu R, Rashid A, et al. Potentially avoidable emergency department attendance: interview study of patients' reasons for attendance. Emerg Med J. 2012; **29**(12): e3.
12. Benahmed N, Laokri S, Zhang WH, Verhaeghe N, Trybou J, Cohen L, et al. Determinants of nonurgent use of the emergency department for pediatric patients in 12 hospitals in Belgium. Eur J Pediatr. 2012; **171**(12): 1829-37.
13. Philips H, Remmen R, De Paepe P, Buylaert W, Van Royen P. Out of hours care: a profile analysis of patients attending the emergency department and the general practitioner on call. BMC Fam Pract. 2010; **11**: 88.
14. Koziol-McLain J, Price DW, Weiss B, Quinn AA, Honigman B. Seeking care for nonurgent medical conditions in the emergency department: through the eyes of the patient. J Emerg Nurs. 2000; **26**(6): 554-63.
15. Gentile S, Vignally P, Durand AC, Gainotti S, Sambuc R, Gerbeaux P. Nonurgent patients in the emergency department? A French formula to prevent misuse. BMC Health Serv Res. 2010; **10**: 66.
16. Bury G, Hungerford P, Langton D, Plunkett P. A & E services in Ireland: the potential role of general practice in accident and emergency services. Ir J Med Sci. 2000; **169**(4): 245-7.
17. Kool RB, Homberg DJ, Kamphuis HC. Towards integration of general practitioner posts and accident and emergency departments: a case study of two integrated emergency posts in the Netherlands. BMC Health Serv Res. 2008; **8**: 225.
18. Lee A, Hazlett CB, Chow S, Lau FL, Kam CW, Wong P, et al. How to minimize inappropriate utilization of Accident and Emergency Departments: improve the validity of classifying the general practice cases amongst the A&E attendees. Health Policy. 2003; **66**(2): 159-68.
19. Huibers L, Thijssen W, Koetsenruijter J, Giesen P, Grol R, Wensing M. GP cooperative and emergency department: an exploration of patient flows. J Eval Clin Pract. 2013; **19**(2): 243-9.

20. Elley CR, Randall PJ, Bratt D, Freeman P. Can primary care patients be identified within an emergency department workload? N Z Med J. 2007; **120**(1256): U2583.
21. Dale J, Green J, Reid F, Glucksman E. Primary care in the accident and emergency department: I. Prospective identification of patients. BMJ. 1995; **311**(7002): 423-6.
22. Pileggi C, Raffaele G, Angelillo IF. Paediatric utilization of an emergency department in Italy. Eur J Public Health. 2006; **16**(5): 565-9.
23. Carson D, Stern R, Clay H. Urgent Care. A practical guide to transforming same-day care in general practice. Lewes, East Sussex: Primary Care Foundation; 2009.
24. Khangura JK, Flodgren G, Perera R, Rowe BH, Shepperd S. Primary care professionals providing non-urgent care in hospital emergency departments. Cochrane Database Syst Rev. 2012; **11**: CD002097.
25. Lowy A, Kohler B, Nicholl J. Attendance at accident and emergency departments: unnecessary or inappropriate? Journal of public health medicine. 1994; **16**(2): 134-40.
26. Sempere-Selva T, Peiro S, Sendra-Pina P, Martinez-Espin C, Lopez-Aguilera I. Inappropriate use of an accident and emergency department: magnitude, associated factors, and reasons--an approach with explicit criteria. Ann Emerg Med. 2001; **37**(6): 568-79.
27. Gribben B. General practitioners' assessments of the primary care caseload in Middlemore Hospital Emergency Department. N Z Med J. 2003; **116**(1169): U329.
28. Bickerton J, Davies J, Davies H, Apau D, Procter S. Streaming primary urgent care: a prospective approach. Prim Health Care Res Dev. 2012; **13**(2): 142-52.
29. Dallaire C, Poitras J, Aubin K, Lavoie A, Moore L. Emergency department triage: do experienced nurses agree on triage scores? J Emerg Med. 2012; **42**(6): 736-40.
30. Nakagawa J, Ouk S, Schwartz B, Schriger DL. Interobserver agreement in emergency department triage. Ann Emerg Med. 2003; **41**(2): 191-5.
31. van Uden CJ, Winkens RA, Wesseling G, Fiolet HF, van Schayck OC, Crebolder HF. The impact of a primary care physician cooperative on the caseload of an emergency department: the Maastricht integrated out-of-hours service. J Gen Intern Med. 2005; **20**(7): 612-7.

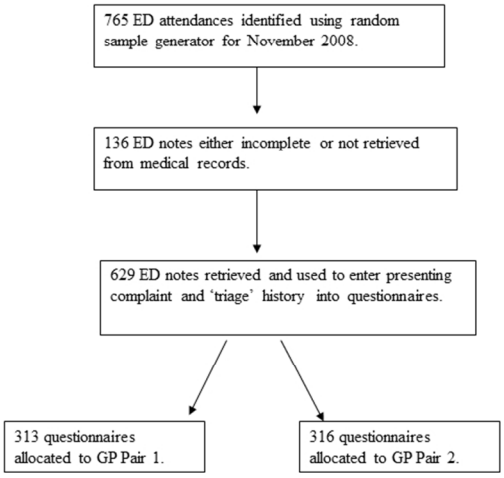

Figure 1. Selection of ED case notes reviewed by general practitioners

Selection of ED case notes reviewed by general practitioners
254x190mm (96 x 96 DPI)

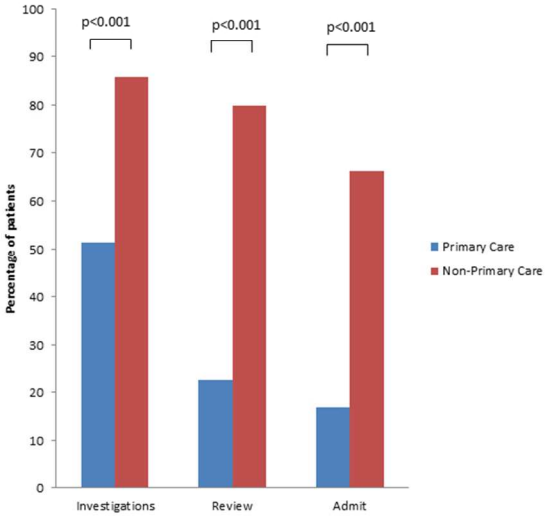

Figure 2. Percentage of patients considered suitable for primary care vs not suitable for primary care requiring investigations, specialist review or hospital admission

Percentage of patients considered suitable for primary care vs not suitable for primary care requiring investigations, specialist review or hospital admission
254x190mm (96 x 96 DPI)